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THERMOPHYSICAL PROPERTIES OF FERROUS STRUCTURAL ALLOYS

Hanford Engineering Development Laboratory

APPLIED TECHNOLOGY

HANFORD ENGINEERING DEVELOPMENT LABORATORY
Operated by Westinghouse Hanford Company
A Subsidiary of Westinghouse Electric Corporation
Prepared for the U.S. Department of Energy
under Contract No. EY-76-C-14-2170
P.O. Box 1970 Richland, WA 99352

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ABSTRACT

This report provides thermophysical properties data for all ferrous structural alloys used in the construction of Code-stamped nuclear components and unfired pressure vessels. Properties include thermal diffusivity, thermal conductivity, specific heat, and thermal expansion (instantaneous, mean, and linear). Tables are provided for each material covering temperatures from room temperature to 1700°F (927°C). Appended to the report are tables correlating nominal composition designations and Unified Numbering System (UNS) numbers with ASME specification numbers, and vice versa.

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THERMOPHYSICAL PROPERTIES OF FERROUS STRUCTURAL ALLOYS

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I. INTRODUCTION

Data on thermophysical properties are essential for the design and analysis of components that operate at elevated temperatures. The Nuclear Systems Materials Handbook (NSMH) Program, among others, provides such data through a thorough assessment of design data/materials properties requirements. The purpose of this document is to report on what was done to meet those requirements.

II. BACKGROUND

Nuclear system components are generally Code-stamped items. This means that they were designed, constructed, and tested in accordance with rules established by the American Society for Mechanical Engineers (ASME) Boiler and Pressure Vessel Code. The design process requires use of several thermophysical properties including thermal conductivity, thermal diffusivity, and thermal expansion. Although values of specific heat are not generally used in Code design, they are required in other performance analyses. Some disagreements exist with respect to the precision required of these properties, but the fact remains that recommended values must be provided for every material used in construction.

Nuclear plants, whether they be light water reactors, sodium or gas-cooled breeders, or fusion reactors, are all constructed using a large variety of common ferrous structural material. Neither the ASME Boiler and Pressure Vessel Code nor the Nuclear Systems Materials Handbook provides adequate thermophysical properties data for all of

the structural materials used or envisioned for use. Recognizing this apparent gap in the available data base, Westinghouse Hanford Company contracted with the Center for Information and Numerical Data Analysis and Synthesis (CINDAS) to develop the required properties data.

CINDAS has, as part of its overall operation, the Thermophysical Properties Research Center (TPRC). This Center, located at Purdue University, maintains an international data base containing over 70,000 unclassified technical papers from worldwide sources. CINDAS was selected for this work on thermophysical properties of ferrous structural materials, because of its close association with the National Bureau of Standards and because of the obvious need to synthesize values where data are essentially nonexistent.

III. SCOPE

The contract work was initially scoped to include only those materials originally identified through the NSMH program. Because of the matrix-type approach used by CINDAS, it was possible to include several additional materials in the study to basically complete the task for nearly every ferrous structural material that might ever be used in the construction of a nuclear plant. In essence, this study eventually encompassed all ferrous materials included within Section III and Section VIII, Division 2 of the ASME Boiler and Pressure Vessel Code.

Eighty different ferrous structural materials were ultimately included in this study. It will become apparent later in the report that one composition can represent several alloys, e.g. 18 Cr - 8 Ni represents AISI 302, 303, 304, 304H, and 304L stainless steels. The following is a listing of the materials included, by major category:

CARBON STEELS

AISI 1010 steel

Plain carbon steels

Carbon - silicon steels

Carbon - manganese steels

Carbon - manganese - silicon steels

Carbon - 1/2 molybdenum steel

LOW ALLOY STEELS

- Chromium Steels -

1/2 Cr - 1/5 Mo

1/2 Cr - 1/5 Mo-V

1/2 Cr - 1/4 Mo-Si

1/2 Cr - 1/2 Mo

1/2 Cr - 1/2 Ni-1/5 Mo

1/2 Cr - 1 1/4 Mn-Si

3/4 Cr - 1/2 Ni-Cu

3/4 Cr - 3/4 Ni-Cu-Al

1 Cr - V

1 Cr - 1/5 Mo

1 Cr - 1/5 Mo-Si

1 Cr - 1/2 Mo

1 Cr - 1/2 Mo-V

1 Cr - 1 Mn-1/4 Mo

1 1/4 Cr - 1/2 Mo

1 1/4 Cr - 1/2 Mo-Si

1 3/4 Cr - 1/2 Mo-Cu

2 Cr - 1/2 Mo

3 Cr - 1 Mo

5 Cr - 1/2 Mo

5 Cr - 1/2 Mo-Si

5 Cr - 1/2 Mo-Ti

7 Cr - 1/2 Mo

9 Cr - 1 Mo

- Manganese Steels -

Mn - V

Mn - 1/4 Mo

Mn - 1/2 Mo

Mn - 1/2 Mo-1/4 Ni

Mn - 1/2 Mo-1/2 Ni

Mn - 1/2 Mo-3/4 Ni

LOW ALLOY STEELS (Cont'd)

- Nickel Steels -

1/2 Ni - 1/2 Mo-V
1/2 Ni - 1/2 Cr-1/4 Mo-V
3/4 Ni - 1/2 Mo-Cr-V
3/4 Ni - 1/2 Cu-Mo
3/4 Ni - 1/2 Mo-1/3 Cr-V
3/4 Ni - 1/2 Cr-1/2 Mo-V
3/4 Ni - 1 Mo-3/4 Cr
1 Ni - 1/2 Cr-1/2 Mo
1 1/4 Ni - 1 Cr-1/2 Mo
1 3/4 Ni - 3/4 Cr-1/4 Mo
2 Ni - 1 Cu
2 Ni - 3/4 Cr-1/4 Mo
2 Ni - 3/4 Cr-1/3 Mo
2 1/2 Ni
3 1/2 Ni
3 1/2 Ni - 1 3/4 Cr-1/2 Mo-V
5 Ni - 1/4 Mo
8 Ni
9 Ni

- Other Low Alloy Steels -

1 1/2 Si - 1/2 Mo

HIGH ALLOY STEELS

12 Cr
12 Cr - 1Al
13 CR
13 Cr - 4 Ni
15 Cr
16 Cr - 12 Ni-2 Mo
16 Cr - 12 Ni-2 Mo-N
17 Cr
17 Cr - 4 Ni-4 Cu
18 Cr - 5 Ni-3 Mo
18 Cr - 8 Ni
18 Cr - 8 Ni-N
18 Cr - 10 Ni-Cb
18 Cr - 10 Ni-Ti
18 Cr - 11 Ni
18 Cr - 13 Ni-3 Mo
18 Cr - 18 Ni-2 Si
19 Cr - 9 Ni-Mo-W
22 Cr - 13 Ni-5 Mn
23 Cr - 12 Ni
25 Cr - 12 Ni
25 Cr - 20 Ni
27 Cr
28 Ni - 19 Cr-Cu-Mo

Properties included within this study are:

- thermal conductivity
- thermal diffusivity
- specific heat
- mean coefficient of thermal expansion (from $70^{o}F$)
- instantaneous coefficient of thermal expansion
- linear thermal expansion (from $70^{o}F$)

Temperatures addressed in this study ranged from room temperature ($70^{o}F$) to as high as $1700^{o}F$ for some materials. Property values are generally listed at $50^{o}F$ intervals beginning at $100^{o}F$, except for those materials/property combinations where the property is undergoing rapid and significant changes within a given $50^{o}F$ interval. In those instances, properties may be provided in 10-$25^{o}F$ intervals.

The properties and temperatures are reported in engineering units. Recognizing that some users of these data will want to use the equivalent International System (SI) of units, the following conversions are provided:

Quantity	Conversion	Factor
Temperature	^{o}F to ^{o}C	$t_C = \frac{t_F - 32}{1.8}$
Thermal conductivity	$\frac{Btu}{hr\ ft\ ^{o}F}$ to $\frac{W}{mK}$	$\frac{W}{mK} = 1.7307 \times \frac{Btu}{hr\ ft\ ^{o}F}$
Thermal diffusivity	$\frac{ft^2}{hr}$ to $\frac{m^2}{s}$	$\frac{m^2}{s} = 2.58 \times 10^{-5} \frac{ft^2}{hr}$
Specific heat	$\frac{Btu}{lb^{o}F}$ to $\frac{J}{kg\ K}$	$\frac{J}{kg\ K} = 4186.8 \times \frac{Btu}{lb^{o}F}$

Quantity	Conversion	Factor
Linear thermal expansion	$\frac{in.}{ft}$ to $\frac{mm}{m}$	$\frac{mm}{m} = 83.33 \times \frac{in.}{ft}$
Instantaneous coefficent of thermal expansion	$^{o}F^{-1}$ to $^{o}K^{-1}$	$^{o}K^{-1} = 0.555 \times {}^{o}F^{-1}$
Mean coefficient of thermal expansion	$^{o}F^{-1}$ to $^{o}K^{-1}$	$^{o}K^{-1} = 0.555 \times {}^{o}F^{-1}$

IV. METHODOLOGY

The personnel at CINDAS first searched their accumulated data base for information on materials whose compositions matched those included in this contract. This information was compiled, evaluated, and subsequently reported to the Westinghouse Hanford Company in the form of graphs, tables, and supporting documentation. The supporting documentation included references, assessments of available data sets, and estimated uncertainties associated with each property. In those instances where essentially no data were found for specific alloy compositions, a snythesis approach was used to make an "educated guess" of the property. Synthesis basically involved first a determination of the theoretical property values from contributions of individual elements comprising the alloy. Secondly, this resultant curve was adjusted to agree or correspond with curves representing actual test results from similar alloys. This technique, when followed by actual tests on the material for which properties have been synthesized, has proven to be very effective and accurate. The

fact that the National Bureau of Standards sanctions this technique for much of their reference work on thermophysical properties lends further credibility.

V. RESULTS

Appendix A provides one page for each of the 80 compositions, listing the six properties identified in the SCOPE section of this report. All results should be considered as nominal or representing the mean property value for average material within that composition range. In some cases, the tables of linear thermal expansion portray different values for cooling measurements. This results in a hysteresis-type behavior and is probably due to unsuitable heating and cooling rates being used near the phase transition temperature. CINDAS warns that the tabulated values in these temperature regions are very uncertain.

Appendix B provides a correlation between the composition designations used in Appendix A and actual alloy designations, specification, and assigned Unified Numbering System (UNS) numbers where they exist.

Appendix C lists the ASME specifications/grades versus the compositions in the same order that they appear in Section II, Part A of the ASME Boiler and Pressure Vessel Code. These numbers correspond directly with ASTM specifications by simply deleting the "S" from the "SA" prefix.

VI. DISCUSSION

Estimated uncertainties of $\pm$10% are generally associated with most of the tabulated values. These uncertainties tend to increase at higher temperatures, particularly approaching any phase transformation temperatures. Uncertainties as low as $\pm$5% were estimated in a few cases, particularly near room temperature for well characterized materials.

The tabulated property values may also be used to estimate densities for corresponding materials. This may be accomplished by using one of the following relationships:

> Density at temperature T (^{o}F) = thermal conductivity divided by the product of thermal diffusivity and specific heat at temperature T (^{o}F).

or

> Density at temperature T (^{o}F) = density at room temperature (70^{o}F) divided by the quantity $1 + 3\alpha_m (T-70)$, where α_m is the mean coefficient of thermal expansion at temperature T ($_{o}$F).

These two methods may produce different results, primarily because different data bases are generally involved. Emphasis is placed on the fact that these techniques are to be used for approximation with the latter technique probably producing the most reliable results.

Values of linear thermal expansion and mean coefficient of thermal expansion, shown in Appendix A, are related through the following equation:

> Linear thermal expansion at temperature T (^{o}F) = the product of the mean coefficient of thermal expansion at temperature T (^{o}F) and the quantity (T-70), where T is in ^{o}F.

The values for linear thermal expansion, when calculated from values of mean coefficients, may not agree in the last decimal place with the values shown in Appendix A. The reason is that the tabulated values of linear thermal expansion were first plotted by CINDAS, through which a smooth curve was passed, and then values were tabulated.

Appendixes B and C include reference to 2 1/4 Cr-1 Mo and A-286 (26 Ni-15 Cr-2Ti steel even though they were not included in this study. Thermophysical properties for these material are given in the NSMH.

Although the properties provided in this report are directed toward elevated temperature nuclear systems, they are equally applicable for nonnuclear applications. Basic properties of materials remain the same regardless of their end use.

VII. SUMMARY

The results provided in this report are unique in that they represent the first comprehensive assessment of thermophysical properties on such a broad spectrum of materials. Moreover, they provide the means to match a set of thermophysical properties to a material described only by specification rather than by generic name or composition.

APPENDIX A

TABLES OF THERMOPHYSICAL PROPERTIES

AISI 1010 STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	37.1	0.734	0.103	6.41	---	0.00
100	36.6	0.711	0.105	6.53	6.50	0.24
150	35.7	0.675	0.108	6.73	6.57	0.64
200	34.9	0.637	0.112	6.93	6.67	1.04
250	34.1	0.602	0.116	7.12	6.77	1.45
300	33.3	0.578	0.118	7.30	6.87	1.90
350	32.5	0.551	0.121	7.49	6.98	2.36
400	31.7	0.525	0.124	7.66	7.07	2.81
450	30.9	0.504	0.126	7.84	7.15	3.25
500	30.1	0.484	0.128	8.03	7.25	3.74
550	29.3	0.465	0.130	8.21	7.34	4.22
600	28.5	0.442	0.132	8.35	7.42	4.68
650	27.7	0.421	0.136	8.51	7.52	5.23
700	26.9	0.398	0.140	8.64	7.59	5.74
750	26.1	0.376	0.144	8.78	7.68	6.26
800	25.4	0.356	0.148	8.90	7.76	6.80
850	24.6	0.338	0.152	9.04	7.85	7.30
900	23.9	0.319	0.156	9.13	7.89	7.86
950	23.1	0.301	0.160	9.22	7.98	8.41
1000	22.4	0.282	0.166	9.30	8.05	8.99
1050	21.7	0.267	0.170	9.39	8.13	9.56
1100	21.0	0.251	0.175	9.45	8.19	10.13
1150	20.3	0.235	0.181	9.51	8.27	10.72
1200	19.6	0.219	0.188	9.56	8.32	11.28
1250	19.1	0.202	0.199	9.59	8.36	11.83
1300	18.5	0.185	0.210	9.62	8.37	12.35
1350	17.8	0.139	0.296	----	8.30	12.80
1400	17.1	0.086	0.420*	----	8.14	13.00
1420	16.9	----	----	----	----	----
1450	----	0.154	0.228	----	7.90	13.08
1475	16.4	----	----	----	----	----
1500	16.3	0.168	0.204	----	7.56	12.97
1550	16.0	0.170	0.198	----	7.11	12.62
1600	15.6	0.172	0.190	----	6.94	12.74
1650	15.5	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

* Extrapolated value.

PLAIN CARBON STEEL
(Mn ≤ 1.0% and Si ≤ 0.10%)

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	35.1	0.695	0.103	6.41	---	0.00
100	34.7	0.674	0.105	6.53	6.50	0.24
150	34.1	0.645	0.108	6.73	6.57	0.64
200	33.6	0.613	0.112	6.93	6.67	1.04
250	32.9	0.585	0.116	7.12	6.77	1.45
300	32.3	0.561	0.118	7.30	6.87	1.90
350	31.6	0.534	0.121	7.49	6.98	2.36
400	30.9	0.512	0.124	7.66	7.07	2.81
450	30.3	0.495	0.126	7.85	7.15	3.25
500	29.5	0.472	0.128	8.03	7.25	3.74
550	28.8	0.453	0.130	8.21	7.34	4.22
600	28.0	0.433	0.132	8.35	7.42	4.68
650	27.3	0.414	0.136	8.51	7.52	5.13
700	26.6	0.394	0.140	8.64	7.59	5.64
750	25.9	0.374	0.144	8.78	7.68	6.
800	25.2	0.355	0.148	8.90	7.76	6.80
850	24.5	0.335	0.152	9.04	7.85	7.30
900	23.8	0.317	0.156	9.13	7.89	7.86
950	23.1	0.301	0.160	9.22	7.98	8.41
1000	22.4	0.282	0.166	9.30	8.05	8.99
1050	21.6	0.265	0.170	9.39	8.13	9.56
1100	20.9	0.250	0.175	9.45	8.19	10.13
1150	20.2	0.234	0.181	9.51	8.27	10.72
1200	19.5	0.218	0.188	9.56	8.32	11.28
1250	18.7	0.197	0.199	9.59	8.36	11.83
1300	18.0	0.180	0.210	9.62	8.37	12.35
1350	17.2	0.134	0.296	----	8.30	12.80
1400	16.4	0.082	0.420*	----	8.14	13.30
1450	15.9	0.147	0.228	----	7.90	13.08
1500	15.7	0.162	0.204	----	7.56	12.97
1550	15.7	0.167	0.198	----	7.11	12.62
1600	15.5	0.173	0.190	----	6.94	12.74
1650	15.4	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

* Extrapolated value.

CARBON-SILICON STEEL
(Mn ≤ 1.0% and 0.10%<Si ≤ 0.60%)

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	30.0	0.582	0.106	5.60	----	0.[illegible]
100	29.9	0.567	0.108	5.83	5.73	0.21
150	29.6	0.544	0.112	6.20	5.91	0.57
200	29.2	0.521	0.116	6.55	6.09	0.95
250	28.9	0.502	0.119	6.88	6.27	1.35
300	28.4	0.481	0.122	7.18	6.43	1.77
350	28.0	0.464	0.125	7.47	6.59	2.22
400	27.6	0.447	0.128	7.73	6.74	2.57
450	27.1	0.430	0.131	7.97	6.89	3.14
500	26.6	0.414	0.133	8.18	7.06	3.64
550	26.1	0.398	0.136	8.38	7.18	4.15
600	25.6	0.385	0.138	8.55	7.28	4.63
650	25.1	0.370	0.141	8.70	7.40	5.15
700	24.6	0.355	0.145	8.83	7.51	5.69
750	24.0	0.337	0.149	8.94	7.61	6.22
800	23.5	0.323	0.152	9.02	7.71	6.76
850	23.0	0.309	0.156	9.09	7.80	7.30
900	22.5	0.296	0.160	9.13	7.86	7.83
950	21.9	0.281	0.164	9.16	7.92	8.36
1000	21.4	0.267	0.169	9.19	8.00	8.93
1050	20.8	0.252	0.174	9.23	8.08	9.50
1100	20.2	0.236	0.180	9.26	8.12	10.03
1150	19.6	0.221	0.188	----	8.21	10.62
1200	19.0	0.206	0.195	----	8.24	11.16
1250	18.3	0.189	0.205	----	8.29	11.69(11.44)**
1300	17.6	0.172	0.216	----	8.31	12.23(11.16)
1350	16.8	0.151	0.236	----	8.21	12.60(10.74)
1400	16.2	0.082	0.420*	----	7.73	12.28(10.82)
1450	15.[illegible]	0.137	0.244	----	7.13	11.81(11.17)
1500	15.6	0.180	0.184	----	6.90	11.83(11.64)
1550	15.5	0.197	0.168	----	6.89	12.19(12.17)
1600	15.4	0.197	0.167	----	6.96	12.79
1650	15.4	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.
**Values in parentheses are for cooling measurements.

CARBON-MANGANESE STEEL
(1.0% < Mn ≤ 1.35% and Si ≤ 0.10%)

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	27.5	0.529	0.103	6.41	----	0.00
100	27.6	0.512	0.105	6.53	6.50	0.24
150	27.6	0.496	0.108	6.73	6.57	0.64
200	27.6	0.486	0.112	6.93	6.67	1.04
250	27.4	0.467	0.116	7.12	6.77	1.45
300	27.2	0.453	0.118	7.30	6.87	1.90
350	27.0	0.440	0.121	7.49	6.98	2.36
400	26.7	0.428	0.124	7.66	7.07	2.81
450	26.3	0.413	0.126	7.84	7.15	3.25
500	25.9	0.398	0.128	8.03	7.25	3.74
550	25.5	0.387	0.130	8.21	7.34	4.22
600	25.0	0.374	0.132	8.35	7.42	4.68
650	24.5	0.360	0.136	8.51	7.52	5.23
700	24.0	0.346	0.140	8.64	7.59	5.74
750	23.5	0.332	0.144	8.78	7.68	6.26
800	23.0	0.318	0.148	8.90	7.76	6.80
850	22.6	0.305	0.152	9.04	7.85	7.30
900	22.1	0.291	0.156	9.13	7.89	7.86
950	21.5	0.277	0.160	9.22	7.98	8.41
1000	21.0	0.263	0.166	9.30	8.05	8.99
1050	20.5	0.249	0.170	9.39	8.13	9.56
1100	19.9	0.237	0.175	9.45	8.19	10.13
1150	19.3	0.219	0.181	9.51	8.27	10.72
1200	18.7	0.202	0.188	9.56	8.32	11.28
1250	18.0	0.184	0.199	9.59**	8.36**	11.83**
1300	17.1	0.159	0.220	9.62**	8.37**	12.35**
1350	16.2	0.122	0.270	----	8.30**	12.80**
1400	15.6	0.078	0.420*	----	8.14**	13.00**
1450	15.2	0.155	0.206	----	7.90**	13.08**
1500	15.1	0.169	0.188	----	7.56	12.97
1550	15.1	0.175	0.182	----	7.11	12.62
1600	15.3	0.179	0.180	----	6.94	12.74
1650	15.4	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

* Extrapolated values.
**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

CARBON-MANGANESE-SILICON STEEL
(1.0% < Mn ≤ 1.65% and 0.10% < Si ≤ 0.60%)

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	23.6	0.454	0.103	5.42	----	0.00
100	23.9	0.443	0.105	5.65	5.53	0.20
150	24.2	0.433	0.108	6.03	5.71	0.55
200	24.	0.422	0.112	6.39	5.89	0.91
250	24.	0.414	0.116	6.73	6.09	1.32
300	24.4	0.406	0.118	7.04	6.26	1.73
350	24.3	0.396	0.121	7.33	6.43	2.16
400	24.2	0.386	0.124	7.60	6.61	2.63
450	23.9	0.375	0.126	7.85	6.77	3.10
500	23.7	0.364	0.128	8.07	6.91	3.58
550	23.4	0.355	0.130	8.28	7.06	4.08
600	23.1	0.346	0.132	8.46	7.17	4.54
650	22.7	0.333	0.136	8.62	7.30	5.09
700	22.4	0.320	0.140	8.75	7.41	5.59
750	22.0	0.308	0.144	8.87	7.50	6.10
800	21.7	0.298	0.148	8.96	7.59	6.63
850	21.2	0.286	0.152	9.03	7.69	7.19
900	20.9	0.274	0.156	9.08	7.77	7.70
950	20.5	0.262	0.160	9.11	7.86	8.24
1000	20.0	0.248	0.166	9.15	7.94	8.81
1050	19.6	0.237	0.170	9.19	8.01	9.38
1100	19.2	0.228	0.175	9.22	8.07	9.92
1150	18.7	0.213	0.181	----	8.16	10.55(10.33)**
1200	18.2	0.197	0.188	----	8.24	11.16(10.54)
1250	17.5	0.179	0.199	----	8.25	11.67(10.46)
1300	16.7	0.155	0.220	----	8.21	12.10(10.15)
1350	15.8	0.119	0.270	----	7.85	12.07(9.88)
1400	15.3	0.077	0.420*	----	7.35	11.66(10.32)
1450	15.1	0.154	0.206	----	6.91	11.44(10.94)
1500	15.1	0.169	0.188	----	6.80	11.71(11.62)
1550	15.1	0.176	0.182	----	6.94	12.31
1600	15.3	0.179	0.180	----	7.10	13.02
1650	15.4	----	----	----	7.27	13.78
1700	----	----	----	----	7.42	14.54

* Extrapolated value.
**Values in parentheses are for cooling measurements.

C - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	24.8	0.482	0.105	5.60	----	0.00
100	25.0	0.477	0.107	5.83	5.73	0.21
150	25.3	0.469	0.110	6.20	5.91	0.57
200	25.5	0.460	0.114	6.55	6.09	0.95
250	25.5	0.448	0.117	6.88	6.27	1.35
300	25.5	0.437	0.120	7.18	5.43	1.77
350	25.4	0.425	0.123	7.47	6.59	2.22
400	25.3	0.413	0.126	7.73	6.74	2.67
450	25.1	0.402	0.129	7.97	6.89	3.14
500	24.8	0.389	0.131	8.18	7.06	3.64
550	24.5	0.378	0.134	8.38	7.18	4.15
600	24.2	0.367	0.136	8.55	7.28	4.63
650	23.8	0.354	0.139	8.70	7.40	5.15
700	23.4	0.341	0.142	8.83	7.51	5.69
750	23.0	0.327	0.146	8.94	7.61	6.22
800	22.6	0.314	0.149	9.02	7.71	6.76
850	22.2	0.301	0.153	9.09	7.80	7.30
900	21.8	0.288	0.158	9.13	7.86	7.83
950	21.3	0.274	0.162	9.16	7.92	8.36
1000	20.8	0.261	0.166	9.19	8.00	8.93
1050	20.3	0.247	0.172	9.23	8.08	9.50
1100	19.8	0.234	0.177	9.26	8.12	10.03
1150	19.2	0.219	0.184	----	8.21	10.62
1200	18.6	0.204	0.191	----	8.24	11.16
1250	17.8	0.186	0.201	----	8.29	11.69(11.44)**
1300	16.8	0.165	0.213	----	8.31	12.23(11.16)
1350	16.0	0.143	0.236	----	8.21	12.60(10.74)
1400	15.4	0.077	0.420*	----	7.73	12.28(10.82)
1450	15.0	0 128	0.248	----	7.13	11.81(11.17)
1500	14.9	0.198	0.160	----	6.90	11.83(11.64)
1550	15.1	0.229	0.139	----	6.89	12.19(12.17)
1600	15.3	0.234	0.138	----	6.96	12.79
1650	15.5	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1/2 Cr - 1/5 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	25.6	0.497	0.105	5.60	----	0.00
100	25.6	0.489	0.107	5.83	5.73	0.21
150	25.6	0.474	0.110	6.20	5.91	0.57
200	25.5	0.459	0.114	6.55	6.09	0.95
250	25.3	0.444	0.117	6.88	6.27	1.35
300	25.1	0.429	0.120	7.18	6.43	1.77
350	24.8	0.415	0.123	7.47	6.59	2.22
400	24.6	0.401	0.126	7.73	6.74	2.67
450	24.3	0.388	0.129	7.97	6.89	3.14
500	23.9	0.375	0.131	8.18	7.06	3.64
550	23.5	0.363	0.134	8.38	7.18	4.15
600	23.1	0.350	0.136	8.55	7.28	4.63
650	22.8	0.339	0.139	8.70	7.40	5.15
700	22.4	0.326	0.142	8.83	7.51	5.69
750	22.0	0.313	0.146	8.94	7.61	6.22
800	21.6	0.300	0.149	9.02	7.71	6.76
850	21.2	0.288	0.153	9.09	7.80	7.30
900	20.8	0.275	0.158	9.13	7.86	7.83
950	20.5	0.264	0.162	9.16	7.92	8.36
1000	20.1	0.251	0.166	9.19	8.00	8.93
1050	19.7	0.240	0.172	9.23	8.08	9.50
1100	19.3	0.227	0.177	9.26	8.12	10.03
1150	18.9	0.215	0.184	----	8.21	10.63
1200	18.4	0.201	0.191	----	8.24	11.16
1250	17.8	0.186	0.201	----	8.29	11.69(11.44)**
1300	17.0	0.168	0.213	----	8.31	12.23(11.16)
1350	15.7	0.140	0.236	----	8.21	12.60(10.74)
1400	15.3	0.077	0.420*	----	7.73	12.28(10.82)
1450	15.2	0.129	0.248	----	7.13	11.81(11.17)
1500	15.1	0.201	0.160	----	6.90	11.83(11.64)
1550	15.2	0.230	0.139	----	6.89	12.19(12.17)
1600	15.3	0.234	0.138	----	6.96	12.79
1650	----	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.

**Values in parentheses are for cooling measurements.

1/2 Cr - 1/5 Mo - V STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	25.4	0.493	0.105	5.60	----	0.00
100	25.4	0.485	0.107	5.83	5.73	0.21
150	25.4	0.470	0.110	6.20	5.91	0.57
200	25.3	0.455	0.114	6.55	6.09	0.95
250	25.1	0.440	0.117	6.88	6.27	1.35
300	24.9	0.427	0.120	7.18	6.43	1.77
350	24.7	0.412	0.123	7.47	6.59	2.22
400	24.4	0.398	0.126	7.73	6.74	2.67
450	24.1	0.386	0.129	7.97	6.89	3.14
500	23.8	0.373	0.131	8.18	7.06	3.64
550	23.4	0.361	0.134	8.38	7.18	4.15
600	23.1	0.349	0.136	8.55	7.28	4.63
650	22.7	0.338	0.139	8.70	7.40	5.15
700	22.3	0.324	0.142	8.83	7.51	5.69
750	21.9	0.312	0.146	8.94	7.61	6.22
800	21.5	0.299	0.149	9.02	7.71	6.76
850	21.1	0.286	0.153	9.09	7.80	7.30
900	20.7	0.274	0.158	9.13	7.86	7.83
950	20.4	0.262	0.162	9.16	7.92	8.36
1000	20.0	0.250	0.166	9.19	8.00	8.93
1050	19.6	0.239	0.172	9.23	8.08	9.50
1100	19.2	0.227	0.177	9.26	8.12	10.03
1150	18.8	0.215	0.184	----	8.21	10.62
1200	18.4	0.201	0.191	----	8.24	11.16
1250	17.9	0.188	0.201	----	8.29	11.69(11.44)**
1300	17.0	0.167	0.213	----	8.31	12.23(11.16)
1350	15.7	0.140	0.236	----	8.21	12.60(10.74)
1400	15.3	0.077	0.420*	----	7.73	12.28(10.82)
1450	15.2	0.129	0.248	----	7.13	11.81(11.17)
1500	15.1	0.200	0.160	----	6.90	11.83(11.64)
1550	15.2	0.230	0.139	----	6.89	12.19(12.17)
1600	15.3	0.234	0.138	----	6.96	12.79
1650	----	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1/2 Cr - 1/5 Mo - Si STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	21.7	0.422	0.105	5.42	----	0.00
100	21.9	0.418	0.107	5.65	5.53	0.20
150	22.1	0.410	0.110	6.03	5.71	0.55
200	22.2	0.399	0.114	6.39	5.89	0.91
250	22.2	0.389	0.117	6.73	6.09	1.32
300	22.1	0.379	0.120	7.04	6.26	1.73
350	22.1	0.369	0.123	7.33	6.43	2.16
400	22.0	0.359	0.126	7.60	6.61	2.63
450	21.9	0.350	0.129	7.85	6.77	3.10
500	21.7	0.340	0.131	8.07	6.91	3.58
550	21.5	0.331	0.134	8.28	7.06	4.08
600	21.3	0.322	0.136	8.46	7.17	4.54
650	21.	0.313	0.139	8.62	7.30	5.09
700	20.8	0.302	0.142	8.75	7.41	5.59
750	20.5	0.292	0.146	8.87	7.50	6.10
800	20.2	0.281	0.149	8.96	7.59	6.63
850	20.0	0.271	0.153	9.03	7.69	7.19
900	19.7	0.260	0.158	9.08	7.77	7.70
950	19.4	0.250	0.162	9.11	7.86	8.24
1000	19.1	0.240	0.166	9.16	7.94	8.81
1050	18.8	0.229	0.172	9.19	8.01	9.38
1100	18.5	0.218	0.177	9.22	8.07	9.92
1150	18.2	0.207	0.184	----	8.16	10.55(10.33)**
1200	17.8	0.194	0.191	----	8.24	11.16(10.54)
1250	17.3	0.181	0.201	----	8.25	11.67(10.46)
1300	16.5	0.163	0.213	----	8.21	12.10(10.15)
1350	15.3	0.136	0.236	----	7.85	12.07(9.88)
1400	15.0	0.075	0.420*	----	7.35	11.66(10.32)
1450	14.9	0.127	0.248	----	6.91	11.44(10.94)
1500	14.9	0.197	0.160	----	6.80	11.71(11.62)
1550	14.9	0.226	0.139	----	6.94	12.31
1600	15.1	0.230	0.138	----	7.10	13.02
1650	----	----	----	----	7.27	13.78
1700	----	----	----	----	7.42	14.54

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1/2 Cr - 1/4 Mo - Si STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	21.7	0.422	0.105	5.42	----	0.00
100	21.9	0.418	0.107	5.65	5.53	0.20
150	22.1	0.410	0.110	6.03	5.71	0.55
200	22.2	0.399	0.114	6.39	5.89	0.91
250	22.2	0.389	0.117	6.73	6.09	1.32
300	22.1	0.379	0.120	7.04	6.26	1.73
350	22.1	0.369	0.123	7.33	6.43	2.16
400	22.0	0.359	0.126	7.60	6.61	2.63
450	21.9	0.350	0.129	7.85	6.77	3.10
500	21.7	0.340	0.131	8.07	6.91	3.58
550	21.5	0.331	0.134	8.28	7.06	4.08
600	21.3	0.322	0.136	8.46	7.17	4.54
650	21.0	0.313	0.139	8.62	7.30	5.09
700	20.8	0.302	0.142	8.75	7.41	5.59
750	20.5	0.292	0.146	8.87	7.50	6.10
800	20.2	0.281	0.149	8.96	7.59	6.63
850	20.0	0.271	0.153	9.03	7.69	7.19
900	19.7	0.260	0.158	9.08	7.77	7.70
950	19.4	0.250	0.162	9.11	7.86	8.24
1000	19.1	0.240	0.166	9.16	7.94	8.81
1050	18.8	0.229	0.172	9.19	8.01	9.38
1100	18.5	0.218	0.177	9.22	8.07	9.92
1150	18.2	0.207	0.184	----	8.16	10.55(10.33)**
1200	17.8	0.194	0.191	----	8.24	11.16(10.54)
1250	17.3	0.181	0.201	----	8.25	11.67(10.46)
1300	16.5	0.163	0.213	----	8.21	12.10(10.15)
1350	15.3	0.136	0.236	----	7.85	12.07(9.88)
1400	15.0	0.075	0.420*	----	7.35	11.66(10.32)
1450	14.9	0.127	0.248	----	6.91	11.44(10.94)
1500	14.9	0.197	0.160	----	6.80	11.71(11.62)
1550	14.9	0.226	0.139	----	6.94	12.31
1600	15.1	0.230	0.138	----	7.10	13.02
1650	----	----	----	----	7.27	13.78
1700	----	----	----	----	7.42	14.54

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1/2 Cr - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	24.8	0.482	0.105	5.60	----	0.00
100	25.0	0.477	0.107	5.83	5.73	0.21
150	25.1	0.466	0.110	6.20	5.91	0.57
200	25.2	0.454	0.114	6.55	6.09	0.95
250	25.2	0.442	0.117	6.88	6.27	1.35
300	25.1	0.430	0.120	7.18	6.43	1.77
350	25.0	0.418	0.123	7.47	6.59	2.22
400	24.8	0.405	0.126	7.73	6.74	2.67
450	24.6	0.394	0.129	7.97	6.89	3.14
500	24.3	0.381	0.131	8.18	7.06	3.64
550	24.0	0.370	0.134	8.38	7.18	4.15
600	23.7	0.359	0.136	8.55	7.28	4.63
650	23.4	0.348	0.139	8.70	7.40	5.15
700	23.0	0.335	0.142	8.83	7.51	5.69
750	22.6	0.322	0.146	8.94	7.61	6.22
800	22.2	0.308	0.149	9.02	7.71	6.76
850	21.9	0.297	0.153	9.09	7.80	7.30
900	21.4	0.283	0.158	9.13	7.86	7.83
950	20.9	0.269	0.162	9.16	7.92	8.36
1000	20.4	0.256	0.166	9.19	8.00	8.93
1050	19.9	0.242	0.172	9.23	8.08	9.50
1100	19.5	0.230	0.177	9.26	8.12	10.03
1150	18.9	0.215	0.184	----	8.21	10.62
1200	18.4	0.202	0.191	----	8.24	11.16
1250	17.7	0.185	0.201	----	8.29	11.69(11.44)**
1300	16.7	0.164	0.213	----	8.31	12.23(11.16)
1350	15.9	0.142	0.236	----	8.21	12.60(10.74)
1400	15.3	0.077	0.420*	----	7.73	12.28(10.82)
1450	15.0	0.128	0.248	----	7.13	11.81(11.17)
1500	15.0	0.199	0.160	----	6.90	11.83(11.64)
1550	15.1	0.229	0.139	----	6.89	12.19(12.17)
1600	15.3	0.234	0.138	----	6.96	12.79
1650	15.5	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1/2 Cr - 1/2 Ni - 1/5 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	23.3	0.454	0.105	5.60	----	0.00
100	23.4	0.447	0.107	5.83	5.73	0.21
150	23.5	0.435	0.110	6.20	5.91	0.57
200	23.4	0.422	0.114	6.55	6.09	0.95
250	23.4	0.411	0.117	6.88	6.27	1.35
300	23.3	0.400	0.120	7.18	6.43	1.77
350	23.2	0.388	0.123	7.47	6.59	2.22
400	23.0	0.376	0.126	7.73	6.74	2.67
450	22.9	0.366	0.129	7.97	6.89	3.14
500	22.6	0.355	0.131	8.18	7.06	3.64
550	22.4	0.345	0.134	8.38	7.18	4.15
600	22.1	0.335	0.136	8.55	7.28	4.63
650	21.9	0.326	0.139	8.70	7.40	5.15
700	21.6	0.314	0.142	8.83	.51	5.69
750	21.3	0.303	0.146	8.94	.61	6.22
800	21.0	0.292	0.149	9.02	7.71	6.76
850	20.7	0.281	0.153	9.09	7.80	7.30
900	20.4	0.270	0.158	9.13	7.86	7.83
950	20.1	0.259	0.162	9.16	7.92	8.36
1000	19.8	0.248	0.166	9.19	8.00	8.93
1050	19.4	0.237	0.172	9.23	8.08	9.50
1100	19.1	0.225	0.177	9.26	8.12	10.03
1150	18.7	0.214	0.184	----	8.21	10.62
1200	18.3	0.200	0.191	----	8.24	11.16
1250	17.7	0.185	0.201	----	8.29	11.69(11.44)**
1300	17.0	0.167	0.213	----	8.31	12.23(11.16)
1350	15.7	0.140	0.236	----	8.21	12.60(10.74)
1400	15.4	0.077	0.420*	----	7.73	12.28(10.82)
1450	15.3	0.130	0.248	----	7.13	11.81(11.17)
1500	15.2	0.202	0.160	----	6.90	11.83(11.64)
1550	15.3	0.232	0.139	----	6.89	12.19(12.17)
1600	15.4	0.235	0.138	----	6.96	12.79
1650	----	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1/2 Cr - 1 1/4 Mn - Si STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	20.5	0.397	0.106	4.86	----	0.00
100	20.6	0.391	0.108	5.26	4.31	0.16
150	20.8	0.382	0.112	5.80	4.77	0.47
200	20.9	0.373	0.116	6.24	5.22	0.82
250	21.0	0.364	0.119	6.61	5.60	1.21
300	21.0	0.355	0.122	6.93	5.92	1.66
350	21.0	0.347	0.125	7.27	6.18	2.08
400	21.0	0.339	0.128	7.55	6.38	2.54
450	20.9	0.332	0.131	7.80	6.56	3.01
500	20.8	0.323	0.133	8.03	6.71	3.47
550	20.6	0.314	0.136	8.23	6.85	3.95
600	20.5	0.308	0.138	8.40	6.93	4.44
650	20.3	0.299	0.141	8.55	7.10	4.93
700	20.1	0.289	0.145	8.68	7.20	5.44
750	19.9	0.279	0.149	8.78	7.32	5.99
800	19.7	0.270	0.152	8.85	7.42	6.52
850	19.4	0.261	0.156	8.90	7.52	7.05
900	19.2	0.252	0.160	8.93	7.61	7.58
950	18.9	0.243	0.164	8.95	7.70	8.12
1000	18.7	0.234	0.169	8.97	7.77	8.68
1050	18.5	0.223	0.174	----	7.85	9.23
1100	18.2	0.213	0.180	----	7.91	9.77
1150	17.9	0.202	0.188	----	7.96	10.32
1200	17.5	0.190	0.195	----	8.01	10.86
1250	17.1	0.176	0.205	----	8.05	11.40(10.63)**
1300	16.4	0.160	0.216	----	8.04	11.90(9.82)
1350	15.1	0.136	0.236	----	8.03	12.38(9.70)
1400	14.9	0.075	0.420*	----	6.75	10.80(10.32)
1450	14.8	0.129	0.244	----	6.60	10.94
1500	14.8	0.171	0.184	----	6.75	11.62
1550	14.9	0.189	0.168	----	6.92	12.31
1600	15.0	0.192	0.167	----	7.08	13.02
1650	----	----	----	----	7.26	13.76

* Extrapolated values.
**Values in parentheses are for cooling measurements.

3/4 Cr - 1/2 Ni - Cu STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	28.3	0.550	0.105	6.41	----	0.00
100	28.2	0.538	0.107	6.53	6.50	0.24
150	27.9	0.518	0.110	6.73	6.57	0.64
200	27.7	0.499	0.114	6.93	6.67	1.04
250	27.4	0.480	0.117	7.12	6.77	1.45
300	27.0	0.463	0.120	7.30	6.87	1.90
350	26.7	0.446	0.123	7.49	6.98	2.36
400	26.3	0.429	0.126	7.66	7.07	2.81
450	25.9	0.414	0.129	7.84	7.15	3.25
500	25.5	0.399	0.131	8.03	7.25	3.74
550	25.0	0.385	0.134	8.21	7.34	4.22
600	24.5	0.371	0.136	8.35	7.42	4.68
650	24.0	0.357	0.139	8.51	7.52	5.23
700	23.5	0.342	0.142	8.64	7.59	5.74
750	23.0	0.328	0.146	8.78	7.68	6.26
800	22.6	0.314	0.149	8.90	7.76	6.80
850	22.1	0.300	0.153	9.04	7.85	7.30
900	21.7	0.286	0.158	9.13	7.89	7.86
950	21.2	0.273	0.162	9.22	7.98	8.41
1000	20.8	0.260	0.166	9.30	8.05	8.99
1050	20.4	0.248	0.172	9.39	8.13	9.56
1100	19.9	0.235	0.177	9.45	8.19	10.13
1150	19.5	0.222	0.184	9.51	8.27	10.72
1200	18.9	0.207	0.191	9.56	8.32	11.28
1250	18.3	0.191	0.201	9.59**	8.36**	11.83**
1300	17.5	0.172	0.213	9.62**	8.37**	12.35**
1350	16.0	0.143	0.236	----	8.30**	12.80**
1400	15.6	0.078	0.420*	----	8.14**	13.00**
1450	15.4	0.131	0.248	----	7.90**	13.08**
1500	15.3	0.203	0.160	----	7.56**	12.97
1550	15.4	0.233	0.139	----	7.11	12.62
1600	15.5	0.236	0.138	---	6.94	12.74
1650	----	----	----	---	6.92	13.13
1700	----	----	----	----	7.04	13.76

* Extrapolated values.

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

3/4 Cr - 3/4 Ni - Cu - Al STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	23.5	0.458	0.105	6.41	----	0.00
100	23.6	0.450	0.107	6.53	6.50	0.24
150	23.6	0.438	0.110	6.73	6.57	0.64
200	23.6	0.425	0.114	6.93	6.67	1.04
250	23.5	0 413	0.117	7.12	6.77	1.45
300	23.4	0.401	0.120	7.30	6.87	1.90
350	23.3	0.389	0.123	7.49	6.98	2.36
400	23.1	0.378	0.126	7.66	7.07	2.81
450	22.9	0.367	0.129	7.84	7.15	3.25
500	22.7	0.356	0.131	8.03	7.25	3.74
550	22.5	0.346	0.134	8.21	7.34	4.22
600	22.2	0.336	0.136	8.35	7.42	4.68
650	21.9	0.326	0.139	8.51	7.52	5.23
700	21.6	0.315	0.142	8.64	7.59	5.74
750	21.3	0.303	0.146	8.78	7.68	6.26
800	21.0	0.292	0.149	8.90	7.76	6.80
850	20.7	0.280	0.153	9.04	7.85	7.30
900	20.3	0.269	0.158	9.13	7.89	7.86
950	20.0	0.258	0.162	9.22	7.98	8.41
1000	19.7	0.247	0.166	9.30	8.05	8.99
1050	19.4	0.236	0.172	9.39	8.13	9.56
1100	19.0	0.224	0.177	9.45	8.19	10.13
1150	18.7	0.213	0.184	9.51	8.27	10.72
1200	18.2	0.200	0.191	9.56	8.32	11.28
1250	17.7	0.185	0.201	9.59**	8.36**	11.83**
1300	16.9	0.167	0.213	9.62**	8.37**	12.35**
1350	15.6	0.139	0.236	----	8.30**	12.80**
1400	15.3	0.077	0.420*	----	8.14**	13.00**
1450	15.2	0.129	0.248	----	7.90**	13.08**
1500	15.1	0 200	0.160	----	7.56	12.97
1550	15.1	0.230	0.139	----	7.11	12.62
1600	15.3	0.233	0.138	----	6.94	12.74
1650	----	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

* Extrapolated values.

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

1 Cr - V STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	28.3	0.550	0.105	5.60	----	0.00
100	28.2	0.538	0.107	5.83	5.73	0.21
150	28.0	0.518	0.110	6.20	5.91	0.57
200	27.7	0.500	0.114	6.55	6.09	0.95
250	27.5	0.482	0.117	6.88	6.27	1.35
300	27.1	0.465	0.120	7.18	6.43	1.77
350	26.8	0.447	0.123	7.47	6.59	2.22
400	26.4	0.431	0.126	7.73	6.74	2.67
450	26.0	0.416	0.129	7.97	6.89	3.14
500	25.5	0.400	0.131	8.18	7.06	3.64
550	25.0	0.386	0.134	8.38	7.18	4.15
600	24.5	0.372	0.136	8.55	7.28	4.63
650	24.0	0.358	0.139	8.70	7.40	5.15
700	23.5	0.343	0.142	8.83	7.51	5.69
750	23.0	0.328	0.146	8.94	7.61	6.22
800	22.6	0.314	0.149	9.02	7.71	6.76
850	22.1	0.300	0.153	9.09	7.80	7.30
900	21.6	0.286	0.158	9.13	7.86	7.83
950	21.2	0.273	0.162	9.16	7.92	8.36
1000	20.8	0.260	0.166	9.19	8.00	8.93
1050	20.3	0.247	0.172	9.23	8.08	9.50
1100	19.9	0.234	0.177	9.26	8.12	10.03
1150	19.5	0.222	0.184	----	8.21	10.62
1200	19.0	0.208	0.191	----	8.24	11.16
1250	18.3	0.191	0.201	----	8.29	11.69(11.44)**
1300	17.5	0.172	0.213	----	8.31	12.23(11.16)
1350	16.0	0.143	0.236	----	8.21	12.60(10.74)
1400	15.6	0.078	0.420*	----	7.73	12.28(10.82)
1450	15.4	0.131	0.248	----	7.13	11.81(11.17)
1500	15.3	0.203	0.160	----	6.90	11.83(11.64)
1550	15.4	0.233	0.139	----	6.89	12.19(12.17)
1600	15.5	0.236	0.138	----	6.96	12.79
1650	----	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1 Cr - 1/5 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	23.9	0.464	0.105	5.60	----	0.00
100	24.0	0.458	0.107	5.83	5.73	0.21
150	24.0	0.445	0.110	6.20	5.91	0.57
200	24.0	0.432	0.114	6.55	6.09	0.95
250	23.9	0.420	0.117	6.88	6.27	1.35
300	23.8	0.408	0.120	7.18	6.43	1.77
350	23.7	0.396	0.123	7.47	6.59	2.22
400	23.5	0.384	0.126	7.73	6.74	2.67
450	23.3	0.373	0.129	7.97	6.89	3.14
500	23.1	0.362	0.131	8.18	7.06	3.64
550	22.8	0.351	0.134	8.38	7.18	4.15
600	22.5	0.341	0.136	8.55	7.28	4.63
650	22.2	0.330	0.139	8.70	7.40	5.15
700	21.9	0.319	0.142	8.83	7.51	5.69
750	21.5	0.307	0.146	8.94	7.61	6.22
800	21.2	0.295	0.149	9.02	7.71	6.76
850	20.9	0.283	0.153	9.09	7.80	7.30
900	20.5	0.272	0.158	9.13	7.86	7.83
950	20.2	0.260	0.162	9.16	7.92	8.36
1000	19.9	0.249	0.166	9.19	8.00	8.93
[illegible]50	19.5	0.238	0.172	9.23	8.08	9.50
[illegible]00	19.2	0.227	0.177	9.26	8.12	10.03
1150	18.9	0.215	0.184	----	8.21	10.62
1200	18.4	0.201	0.191	----	8.24	11.16
1250	17.8	0.186	0.201	----	8.29	11.69(11.44)**
1300	17.1	0.168	0.213	----	8.31	12.23(11.16)
1350	15.7	0.140	0.236	----	8.21	12.60(10.74)
1400	15.4	0.077	0.420*	----	7.73	12.28(10.82)
1450	15.3	0.130	0.248	----	7.13	11.81(11.17)
1500	15.2	0.202	0.160	----	6.90	11.83(11.64)
1550	15.3	0.231	0.139	----	6.89	12.19(12.17)
1600	15.4	0.235	0.138	----	6.96	12.79
1650	----	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1 Cr - 1/5 Mo - Si STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	25.8	0.502	0.105	5.60	----	0.00
100	25.9	0.494	0.107	5.83	5.73	0.21
150	25.9	0.480	0.110	6.20	5.91	0.57
200	25.8	0.464	0.114	6.55	6.09	0.95
250	25.6	0.449	0.117	6.88	6.27	1.35
300	25.4	0.435	0.120	7.18	6.43	1.77
350	25.2	0.421	0.123	7.47	6.59	2.22
400	24.9	0.407	0.126	7.73	6.74	2.67
450	24.6	0.393	0.129	7.97	6.89	3.14
500	24.2	0.380	0.131	8.18	7.06	3.64
550	23.8	0.367	0.134	8.38	7.18	4.15
600	23.4	0.355	0.136	8.55	7.28	4.63
650	23.0	0.342	0.139	8.70	7.40	5.15
700	22.6	0.329	0.142	8.83	7.51	5.69
750	22.2	0.316	0.146	8.94	7.61	6.22
800	21.8	0.303	0.149	9.02	7.71	6.76
850	21.4	0.290	0.153	9.09	7.80	7.30
900	21.0	0.277	0.158	9.13	7.86	7.83
950	20.6	0.265	0.162	9.16	7.92	8.36
1000	20.2	0.253	0.166	9.19	8.00	8.93
1050	19.8	0.241	0.172	9.23	8.08	9.50
1100	19.4	0.229	0.177	9.26	8.12	10.03
1150	19.0	0.217	0.184	----	8.21	10.62
1200	18.5	0.202	0.191	----	8.24	11.16
1250	17.9	0.187	0.201	----	8.29	11.69(11.44)**
1300	17.1	0.168	0.213	----	8.31	12.23(11.16)
1350	15.8	0.141	0.236	----	8.21	12.60(10.74)
1400	15.4	0.077	0.420*	----	7.73	12.28(10.82)
1450	15.2	0.129	0.248	----	7.13	11.81(11.17)
1500	15.2	0.201	0.160	----	6.90	11.83(11.64)
1550	15.2	0.230	0.139	----	6.89	12.19(12.17)
1600	15.3	0.234	0.138	----	6.96	12.79
1650	----	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1 Cr - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	24.4	0.474	0.105	5.60	----	0.00
100	24.5	0.468	0.107	5.83	5.73	0.21
150	24.5	0.455	0.110	6.20	5.91	0.57
200	24.6	0.442	0.114	6.55	6.09	0.95
250	24.5	0.429	0.117	6.88	6.27	1.35
300	24.3	0.417	0.120	7.18	6.43	1.77
350	24.2	0.404	0.123	7.47	6.59	2.22
400	23.9	0.391	0.126	7.73	6.74	2.67
450	23.7	0.379	0.129	7.97	6.89	3.14
500	23.4	0.367	0.131	8.18	7.06	3.64
550	23.1	0.356	0.134	8.38	7.18	4.15
600	22.7	0.344	0.136	8.55	7.28	4.63
650	22.4	0.333	0.139	8.70	7.40	5.15
700	22.0	0.320	0.142	8.83	7.51	5.69
750	21.6	0.308	0.146	8.94	7.61	6.22
800	21.3	0.296	0.149	9.02	7.71	6.76
850	20.9	0.283	0.153	9.09	7.80	7.30
900	20.5	0.271	0.158	9.13	7.86	7.8[illegible]
950	20.2	0.260	0.162	9.16	7.92	8.36
1000	19.8	0.248	0.166	9.19	8.00	8.93
1050	19.4	0.236	0.172	9.23	8.08	9.50
1100	19.0	0.225	0.177	9.26	8.12	10.03
1150	18.7	0.213	0.184	----	8.21	10.62
1200	18.2	0.199	0.191	----	8.24	11.16
1250	17.6	0.184	0.201	----	8.29	11.69(11.44)**
1300	16.8	0.166	0.213	----	8.31	12.23(11.16)
1350	15.6	0.139	0.236	----	8.21	12.60(10.74)
1400	15.3	0.077	0.420*	----	7.73	12.28(10.82)
1450	15.1	0.128	0.248	----	7.13	11.81(11.17)
1500	15.0	0.199	0.160	----	6.90	11.83(11.64)
1550	15.0	0.228	0.139	----	6.89	12.19(12.17)
1600	15.2	0.232	0.138	----	6.96	12.79
1650	----	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1 Cr - 1/2 Mo - V STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	21.7	0.421	0.106	5.42	----	0.00
100	21.9	0.415	0.108	5.65	5.53	0.20
150	22.0	0.404	0.112	6.03	5.71	0.55
200	22.1	0.394	0.116	6.39	5.89	0.91
250	22.1	0.384	0.119	6.73	6.09	1.32
300	22.1	0.375	0.122	7.04	6.26	1.73
350	22.1	0.366	0.125	7.33	6.43	2.16
400	22.0	0.357	0.128	7.60	6.61	2.63
450	21.9	0.349	0.131	7.85	6.77	3.10
500	21.8	0.339	0.133	8.07	6.91	3.58
550	21.6	0.330	0.136	8.28	7.06	4.08
600	21.4	0.322	0.138	8.46	7.17	4.54
650	21.2	0.313	0.141	8.62	7.30	5.09
700	20.9	0.302	0.145	8.75	7.41	5.59
750	20.7	0.290	0.149	8.87	7.50	6.10
800	20.4	0.280	0.152	8.96	7.59	6.63
850	20.1	0.271	0.156	9.03	7.69	7.19
900	19.9	0.261	0.160	9.08	7.77	7.70
950	19.6	0.251	0.164	9.11	7.86	8.24
1000	19.3	0.241	0.169	9.16	7.94	8.81
1050	19.0	0.230	0.174	9.19	8.01	9.38
1100	18.7	0.219	0.180	9.22	8.07	9.92
1150	18.4	0.207	0.188	----	8.16	10.55(10.33)**
1200	18.0	0.194	0.195	----	8.24	11.16(10.54)
1250	17.3	0.179	0.205	----	8.25	11.67(10.46)
1300	16.6	0.162	0.216	----	8.21	12.10(10.15)
1350	15.6	0.140	0.236	----	7.85	12.07(9.88)
1400	15.3	0.077	0.420*	----	7.35	11.66(10.32)
1450	15.1	0.132	0.244	----	6.91	11.44(10.94)
1500	15.1	0.174	0.184	----	6.80	11.71(11.62)
1550	15.2	0.192	0.168	----	6.94	12.31
1600	15.3	0.195	0.167	----	7.10	13.02
1650	----	----	----	----	7.27	13.78
1700	----	----	----	----	7.42	14.54

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1 Cr - 1 Mn - 1/4 Mo STEEL

Temperature (F)	Thermal Conductivjty (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivjty (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	21.6	0.498	0.105	5.60	----	0.00
100	22.0	0.490	0.107	5.83	5.73	0.21
150	22.5	0.476	0.111	6.20	5.91	0.57
200	22.8	0.463	0.114	6.55	6.09	0.95
250	23.1	0.449	0.117	6.88	6.27	1.35
300	23.2	0.435	0.120	7.18	6.43	1.78
350	23.3	0.420	0.123	7.47	6.59	2.21
400	23.3	0.406	0.126	7.73	6.74	2.67
450	23.2	0.393	0.128	7.97	6.89	3.14
500	23.0	0.379	0.131	8.18	7.06	3.64
550	22.8	0.365	0.134	8.38	7.18	4.14
600	22.6	0.351	0.136	8.55	7.28	4.63
650	22.3	0.338	0.139	8.70	7.40	5.15
700	22.0	0.324	0.143	8.83	7.51	5.68
750	21.7	0.311	0.146	8.94	7.61	6.21
800	21.4	0.298	0.150	9.02	7.71	6.75
850	21.0	0.285	0.154	9.09	7.80	7.30
900	20.7	0.272	0.158	9.13	7.86	7.83
950	20.3	0.261	0.162	9.16	7.92	8.36
1000	20.0	0.250	0.167	9.19	8.00	8.93
1050	19.6	0.238	0.172	9.23	8.08	9.50
1100	19.1	0.227	0.178	9.26	8.12	10.04
1150	18.7	0.216	0.186	----	8.21	10.64
1200	18.3	0.203	0.196	----	8.24	11.17
1250	17.8	0.189	0.208	----	8.29	11.69(11.44)**
1300	17.2	0.171	0.224	----	8.31	12.23(11.16)
1350	16.4	0.150	0.247	----	8.21	12.60(10.74)
1400	15.1	0.120	0.330*	----	7.73	12.28(10.82)
1450	14.9	0.151	0.230	---	7.13	11.81(11.17)
1500	15.0	0.176	0.187	----	6.90	11.83(11.64)

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1 1/4 Cr - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	21.9	0.426	0.105	5.42	----	0.00
100	22.1	0.421	0.107	5.65	5.53	0.20
150	22.2	0.412	0.110	6.03	5.71	0.55
200	22.3	0.403	0.114	6.39	5.89	0.91
250	22.4	0.393	0.117	6.73	6.09	1.32
300	22.4	0.384	0.120	7.04	6.26	1.73
350	22.4	0.374	0.123	7.33	6.43	2.16
400	22.3	0.364	0.126	7.60	6.61	2.63
450	22.1	0.354	0.129	7.85	6.77	3.10
500	22.0	0.344	0.131	8.07	6.91	3.58
550	21.8	0.335	0.134	8.28	7.06	4.08
600	21.5	0.326	0.136	8.46	7.17	4.54
650	21.2	0.316	0.139	8.62	7.30	5.09
700	21.0	0.305	0.142	8.75	7.41	5.59
750	20.7	0.294	0.146	8.87	7.50	6.10
800	20.4	0.283	0.149	8.96	7.59	6.63
850	20.1	0.272	0.153	9.03	7.69	7.19
900	19.8	0.262	0.158	9.08	7.77	7.70
950	19.5	0.251	0.162	9.11	7.86	8.24
1000	19.2	0.241	0.166	9.16	7.94	8.81
1050	18.9	0.230	0.172	9.19	8.01	9.38
1100	18.6	0.220	0.177	9.22	8.07	9.92
1150	18.3	0.208	0.184	----	8.16	10.55(10.33)**
1200	17.9	0.196	0.191	----	8.24	11.16(10.54)
1250	17.3	0.182	0.201	----	8.25	11.57(10.46)
1300	16.6	0.164	0.213	----	8.21	12.10(10.15)
1350	15.4	0.138	0.236	----	7.85	12.07(9.88)
1400	15.1	0.076	0.420*	----	7.35	11.66(10.32)
1450	15.0	0.127	0.248	----	6.91	11.44(10.94)
1500	14.9	0.198	0.160	----	6.80	11.71(11.62)
1550	15.0	0.227	0.139	----	6.94	12.31
1600	15.1	0.231	0.138	----	7.10	13.02
1650	----	----	----	----	7.27	13.78
1700	----	----	----	----	7.42	14.54

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1 1/4 Cr - 1/2 Mo - Si STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	21.3	0.414	0.106	5.42	----	0.00
100	21.5	0.409	0.108	5.65	5.53	0.20
150	21.8	0.400	0.112	6.03	5.71	0.55
200	21.9	0.391	0.116	6.39	5.89	0.91
250	22.0	0.382	0.119	6.73	6.09	1.32
300	22.0	0.373	0.122	7.04	6.26	1.73
350	22.0	0.365	0.125	7.33	6.43	2.16
400	21.9	0.356	0.128	7.60	6.61	2.63
450	21.8	0.347	0.131	7.85	6.77	3.10
500	21.7	0.337	0.133	8.07	6.91	3.58
550	21.5	0.327	0.136	8.28	7.06	4.08
600	21.3	0.320	0.138	8.46	7.17	4.54
650	21.0	0.310	0.141	8.62	7.30	5.09
700	20.8	0.299	0.145	8.75	7.41	5.59
750	20.5	0.288	0.149	8.87	7.50	6.10
800	20.2	0.278	0.152	8.96	7.59	6.63
850	20.0	0.268	0.156	9.03	7.69	7.19
900	19.7	0.258	0.160	9.08	7.77	7.70
950	19.4	0.248	0.164	9.11	7.86	8.24
1000	19.1	0.238	0.169	9.16	7.94	8.81
1050	18.8	0.227	0.174	9.19	8.01	9.38
1100	18.5	0.216	0.180	9.22	8.07	9.92
1150	18.2	0.204	0.188	----	8.16	10.55(10.33)**
1200	17.7	0.192	0.195	----	8.24	11.16(10.54)
1250	17.2	0.178	0.205	----	8.25	11.67(10.46)
1300	16.5	0.161	0.216	----	8.21	12.10(10.15)
1350	15.3	0.138	0.236	----	7.85	12.07(9.88)
1400	15.0	0.076	0.420*	----	7.35	11.66(10.32)
1450	14.9	0.130	0.244	----	6.91	11.44(10.94)
1500	14.8	0.171	0.184	----	6.80	11.71(11.62)
1550	14.9	0.188	0.168	----	6.94	12.31
1600	15.0	0.191	0.167	----	7.10	13.02
1650	----	----	----	----	7.27	13.78
1700	----	----	----	----	7.42	14.54

* Extrapolated values.
**Values in parentheses are for cooling measurements.

1 3/4 Cr - 1/2 Mo - Cu STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	25.2	0.490	0.105	5.60	----	0.00
100	25.3	0.483	0.107	5.83	5.73	0.21
150	25.3	0.469	0.110	6.20	5.91	0.57
200	25.2	0.455	0.114	6.55	6.09	0.95
250	25.1	0.440	0.117	6.88	6.27	1.35
300	24.9	0.427	0.120	7.18	6.43	1.77
350	24.7	0.413	0.123	7.47	6.59	2.22
400	24.5	0.400	0.126	7.73	6.74	2.67
450	24.2	0.387	0.129	7.97	6.89	3.14
500	23.9	0.374	0.131	8.18	7.06	3.64
550	23.5	0.362	0.134	8.38	7.18	4.15
600	23.1	0.350	0.136	8.55	7.20	4.63
650	22.7	0.338	0.139	8.70	7.40	5.15
700	22.3	0.325	0.142	8.83	7.51	5.69
750	22.0	0.312	0.146	8.94	7.61	6.22
800	21.6	0.300	0.149	9.02	7.71	6.76
850	21.2	0.287	0.153	9.09	7.80	7.30
900	20.8	0.275	0.158	9.13	7.86	7.83
950	20.4	0.263	0.162	9.16	7.92	8.36
1000	20.0	0.251	0.166	9.19	8.00	8.93
1050	19.7	0.239	0.172	9.23	8.08	9.50
1100	19.3	0.227	0.177	9.26	8.12	10.03
1150	18.9	0.215	0.184	----	8.21	10.62
1200	18.4	0.201	0.191	----	8.24	11.16
1250	17.8	0.186	0.201	----	8.29	11.69(11.44)**
1300	17.0	0.168	0.213	----	8.31	12.23(11.16)
1350	15.7	0.140	0.236	----	8.21	12.60(10.74)
1400	15.4	0.077	0.420*	----	7.73	12.28(10.82)
1450	15.2	0.129	0.248	---	7.13	11.81(11.17)
1500	15.1	0.200	0.160	----	6.30	11.83(11.64)
1550	15.2	0.230	0.139	----	6.89	12.19(12.17)
1600	15.3	0.234	0.138	----	6.96	12.79
1650	----	----	----	----	7.08	13.44
1700	----	----	----	----	7.20	14.12

* Extrapolated values.
**Values in parentheses are for cooling measurements.

2 Cr - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	24.2	0.471	0.105	5.42	----	0.00
100	24.3	0.464	0.107	5.65	5.53	0.20
150	24.4	0.452	0.110	6.03	5.71	0.55
200	24.4	0.439	0.114	6.39	5.89	0.91
250	24.3	0.426	0.117	6.73	6.09	1.32
300	24.2	0.414	0.120	7.04	6.26	1.73
350	24.0	0.402	0.123	7.33	6.43	2.16
400	23.9	0.390	0.126	7.60	6.61	2.63
450	23.6	0.378	0.129	7.85	6.77	3.10
500	23.4	0.367	0.131	8.07	6.91	3.58
550	23.1	0.355	0.134	8.28	7.06	4.09
600	22.7	0.344	0.136	8.46	7.17	4.54
650	22.3	0.333	0.139	8.62	7.30	5.09
700	22.0	0.320	0.142	8.75	7.41	5.59
750	21.6	0.307	0.146	8.87	7.50	6.10
800	21.2	0.295	0.149	8.96	7.59	6.63
850	20.9	0.283	0.153	9.03	7.69	7.19
900	20.5	0.271	0.158	9.08	7.77	7.70
950	20.1	0.259	0.162	9.11	7.86	8.24
1000	19.8	0.248	0.166	9.16	7.94	8.81
1050	19.4	0.236	0.172	9.19	8.01	9.38
1100	19.1	0.225	0.177	9.22	8.07	9.92
1150	18.7	0.213	0.184	----	8.16	10.55(10.33)**
1200	18.2	0.199	0.191	----	8.24	11.16(10.54)
1250	17.5	0.184	0.201	----	8.25	11.67(10.46)
1300	16.9	0.166	0.213	----	8.21	12.10(10.15)
1350	15.6	0.139	0.236	----	7.85	12.07(9.88)
1400	15.3	0.077	0.420*	----	7.35	11.66(10.32)
1450	15.1	0.128	0.248	----	6.91	11.44(10.94)
1500	15.0	0.199	0.160	----	6.80	11.71(11.62)
1550	15.0	0.228	0.139	----	6.94	12.31
1600	15.2	0.232	0.138	----	7.10	13.02
1650	----	----	----	----	7.27	13.78
1700	----	----	----	----	7.42	14.54

* Extrapolated values.
**Values in parentheses are for cooling measurements.

3 Cr - 1 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	18.6	0.361	0.106	5.42	----	0.00
100	19.0	0.362	0.108	5.65	5.53	0.20
150	19.6	0.366	0.110	6.03	5.71	0.55
200	20.1	0.368	0.112	6.39	5.89	0.92
250	20.4	0.365	0.115	6.73	6.09	1.32
300	20.7	0.360	0.118	7.04	6.26	1.80
350	20.9	0.357	0.120	7.33	6.43	2.16
400	21.0	0.351	0.123	7.60	6.61	2.62
450	21.0	0.343	0.126	7.85	6.77	3.09
500	21.0	0.334	0.129	8.07	6.91	3.57
550	20.9	0.325	0.132	8.28	7.06	4.07
600	20.8	0.316	0.135	8.46	7.17	4.56
650	20.6	0.304	0.139	8.62	7.30	5.08
700	20.4	0.293	0.143	8.75	7.41	5.60
750	20.2	0.282	0.147	8.87	7.50	6.12
800	20.0	0.270	0.151	8.96	7.59	6.65
850	19.7	0.259	0.156	9.03	7.69	7.20
900	19.5	0.249	0.160	9.08	7.77	7.74
950	19.2	0.239	0.165	9.11	7.86	8.30
1000	18.9	0.228	0.170	9.16	7.94	8.86
1050	18.6	0.218	0.175	9.19	8.01	9.42
1100	18.3	0.207	0.181	9.22	8.07	9.98
1150	18.0	0.195	0.189	----	8.16	10.55(10.33)**
1200	17.7	0.184	0.197	----	8.24	11.16(10.54)
1250	17.3	0.171	0.208	----	8.25	11.67(10.46)
1300	17.0	0.157	0.222	----	8.21	12.10(10.15)
1350	16.7	0.141	0.243	----	7.85	12.07(9.88)
1400	16.2	0.119	0.278	----	7.35	11.66(10.32)
1425	----	0.106	0.310*	----	----	----
1450	15.9	0.146	0.224	----	6.91	11.41(10.94)
1475	----	0.156	0.210	----	----	----
1500	16.0	0.164	0.200	----	6.80	11.71(11.62)

* Extrapolated values.
**Values in parentheses are for cooling measurements.

5 Cr - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	16.9	0.329	0.106	6.52	----	0.00
100	17.3	0.330	0.108	6.59	6.50	0.26
150	17.8	0.332	0.110	6.71	6.65	0.66
200	18.1	0.333	0.112	6.83	6.73	1.07
250	18.5	0.331	0.115	6.94	6.80	1.49
300	18.7	0.328	0.118	7.04	6.87	1.90
350	19.0	0.325	0.120	7.15	6.93	2.33
400	19.1	0.320	0.123	7.25	6.97	2.76
450	19.2	0.313	0.126	7.35	7.00	3.19
500	19.2	0.307	0.129	7.44	7.05	3.64
550	19.2	0.299	0.132	7.53	7.10	4.09
600	19.2	0.292	0.135	7.62	7.15	4.55
650	19.1	0.282	0.139	7.71	7.19	5.00
700	19.0	0.273	0.143	7.79	7.24	5.47
750	18.8	0.264	0.147	7.87	7.28	5.94
800	18.7	0.255	0.151	7.95	7.32	6.41
850	18.6	0.245	0.156	8.02	7.36	6.89
900	18.4	0.237	0.160	8.09	7.41	7.38
950	18.2	0.227	0.165	8.16	7.44	7.86
1000	18.0	0.218	0.170	8.22	7.48	8.35
1050	17.8	0.209	0.175	8.28	7.53	8.86
1100	17.6	0.200	0.181	8.34	7.56	9.35
1150	17.3	0.189	0.189	8.40	7.60	9.85
1200	17.1	0.179	0.197	8.45	7.64	10.36
1250	16.9	0.167	0.208	8.50	7.68	10.87
1300	16.6	0.154	0.222	8.54	7.71	11.38
1350	16.4	0.139	0.243	8.58	7.74	11.89
1400	16.0	0.117	0.280	8.63	7.77	12.41
1420	----	0.105	0.310	----	----	----
1425	----	0.123	0.265	----	----	----
1450	15.7	0.145	0.224	8.66	7.80	12.92
1500	15.8	0.163	0.200	8.69	7.84	13.45

5 Cr - 1/2 Mo - Si STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	12.2	0.240	0.105	6.52	----	0.00
100	12.5	0.243	0.106	6.59	6.50	0.26
150	13.0	0.245	0.109	6.71	6.65	0.66
200	13.4	0.248	0.111	6.83	6.73	1.07
250	13.8	0.249	0.114	6.94	6.80	1.49
300	14.1	0.249	0.117	7.04	6.87	1.90
350	14.5	0.250	0.119	7.15	6.93	2.33
400	14.8	0.249	0.122	7.25	6.97	2.76
450	15.0	0.247	0.125	7.35	7.00	3.19
500	15.3	0.245	0.128	7.44	7.05	3.64
550	15.5	0.243	0.131	7.53	7.10	4.09
600	15.7	0.241	0.134	7.62	7.15	4.55
650	15.9	0.238	0.138	7.71	7.19	5.00
700	16.1	0.234	0.142	7.79	7.24	5.47
750	16.3	0.230	0.146	7.87	7.28	5.94
800	16.4	0.226	0.150	7.95	7.32	6.41
850	16.5	0.220	0.154	8.02	7.36	6.89
900	16.6	0.215	0.159	8.09	7.41	7.38
950	16.6	0.208	0.164	8.16	7.44	7.86
1000	16.6	0.203	0.169	8.22	7.48	8.35
1050	16.6	0.197	0.174	8.28	7.53	8.86
1100	16.6	0.188	0.181	8.34	7.56	9.35
1150	16.5	0.179	0.189	8.40	7.60	9.85
1200	16.4	0.171	0.197	8.45	7.64	10.36
1250	16.2	0.161	0.208	8.50	7.68	10.87
1300	16.0	0.149	0.222	8.54	7.71	11.38
1350	15.8	0.134	0.243	8.58	7.74	11.89
1400	15.4	0.113	0.280	8.63	7.77	12.41
1420	----	0.102	0.310	----	----	----
1425	----	0.119	0.265	----	----	----
1450	15.2	0.140	0.224	8.66	7.80	12.92
1500	15.3	0.158	0.200	8.69	7.84	13.45

5 Cr - 1/2 Mo - Ti STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	15.9	0.308	0.106	6.52	----	0.00
100	16.2	0.310	0.108	6.59	6.50	0.26
150	16.7	0.313	0.110	6.71	6.65	0.66
200	17.1	0.315	0.112	6.83	6.73	1.07
250	17.5	0.314	0.115	6.94	6.80	1.49
300	17.8	0.313	0.118	7.04	6.87	1.90
350	18.0	0.310	0.120	7.15	6.93	2.33
400	18.2	0.305	0.123	7.25	6.97	2.76
450	18.4	0.300	0.126	7.35	7.00	3.19
500	18.5	0.295	0.129	7.44	7.05	3.64
550	18.5	0.289	0.132	7.53	7.10	4.09
600	18.5	0.283	0.135	7.62	7.15	4.55
650	18.5	0.274	0.139	7.71	7.19	5.00
700	18.5	0.266	0.143	7.79	7.24	5.47
750	18.4	0.258	0.147	7.87	7.28	5.94
800	18.3	0.250	0.151	7.95	7.32	6.41
850	18.2	0.242	0.156	8.02	7.36	6.89
900	18.1	0.233	0.160	8.09	7.41	7.38
950	18.0	0.224	0.165	8.16	7.44	7.86
1000	17.8	0.216	0.170	8.22	.48	8.35
1050	17.6	0.207	0.175	8.28	7.53	8.86
1100	17.4	0.198	0.181	8.34	7.56	9.35
1150	17.2	0.187	0.189	8.40	7.60	9.85
1200	17.0	0.177	0.197	8.45	7.64	10.36
1250	16.8	0.166	0.208	8.50	7.68	10.87
1300	16.5	0.153	0.222	8.54	7.71	11.38
1350	16.2	0.138	0.243	8.58	7.74	11.89
1400	15.8	0.117	0.280	8.63	7.77	12.41
1420	----	0.105	0.310	----	----	----
1425	----	0.122	0.265	----	----	----
1450	15.6	0.144	0.224	8.66	7.80	12..
1500	15.7	0.162	0.200	8.69	7.84	13.45

7 Cr - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	14.1	0.278	0.105	5.82	----	0.00
100	14.4	0.280	0.106	5.90	5.85	0.21
150	14.9	0.281	0.109	6.03	5.93	0.57
200	15.3	0.282	0.112	6.16	6.02	0.94
250	15.7	0.283	0.114	6.29	6.10	1.32
300	16.0	0.282	0.117	6.41	6.15	1.70
350	16.3	0.280	0.120	6.53	6.23	2.09
400	16.5	0.277	0.123	6.64	6.29	2.49
450	16.7	0.273	0.126	6.75	6.34	2.89
500	16.9	0 268	0.130	6.87	6.40	3.30
550	17.0	0.263	0.133	6.97	6.46	3.72
600	17.1	0.257	0.137	7.07	6.51	4.14
650	17.2	0.253	0.139	7.17	6.57	4.57
700	17.2	0.247	0.144	7.27	6.62	5.00
750	17.3	0.240	0.148	7.36	6.66	5.44
800	17.3	0.233	0.153	7.44	6.71	5.88
850	17.3	0.226	0.157	7.53	6.77	6.34
900	17.2	0.219	0.162	7.61	6.82	6.79
950	17.2	0.211	0.167	7.69	6.86	7.25
1000	17.1	0.202	0.174	7.76	6.90	7.70
1050	17.0	0.194	0.180	7.83	6.95	8.17
1100	16.8	0.184	0.188	7.90	7.00	8.65
1150	16.7	0.175	0.196	7.97	7.05	9.13
1200	16.6	0.165	0.207	8.03	7.08	9.60
1250	16.4	0.154	0.220	8.08	7.13	10.09
1300	16.2	0.142	0.236	8.14	7.16	10.57
1350	16.0	0.128	0.257	8.19	7.20	11.06
1390	----	0.112	0.290*	----	----	----
1400	15.6	0.136	0.237	8.23	7.24	11.56
1450	15.4	0.167	0.190	8.28	7.28	12.05
1500	15.5	0.179	0.178	8.32	7.31	12.55

* Extrapolated value.

9 Cr - 1 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	12.8	0.256	0.105	5.82	----	0.00
100	13.1	0.258	0.106	5.90	5.85	0.21
150	13.6	0.260	0.109	6.03	5.93	0.57
200	14.0	0.261	0.112	6.16	6.02	0.94
250	14.4	0.263	0.114	6.29	6.10	1.32
300	14.7	0.262	0.117	6.41	6.15	1.70
350	15.0	0.261	0.120	6.53	6.23	2.09
400	15.2	0.259	0.123	6.64	6.29	2.49
450	15.4	0.256	0.126	6.75	6.34	2.89
500	15.6	0.253	0.129	6.87	6.40	3.30
550	15.8	0.249	0.133	6.97	6.46	3.72
600	15.9	0.245	0.136	7.07	6.51	4.14
650	16.0	0.240	0.140	7.17	6.57	4.57
700	16.0	0.235	0.144	7.27	6.62	5.00
750	16.1	0.229	0.147	7.36	6.66	5.44
800	16.1	0.222	0.152	7.44	6.71	5.88
850	16.2	0.214	0.157	7.53	6.77	6.34
900	16.1	0.207	0.163	7.61	6.82	6.79
950	16.1	0.199	0.169	7.69	6.86	7.25
1000	16.1	0.192	0.175	7.76	6.90	7.70
1050	16.0	0.182	0.183	7.83	6.95	8.17
1100	16.0	0.174	0.191	7.90	7.00	8.65
1150	15.9	0.165	0.201	7.97	7.05	9.13
1200	15.8	0.155	0.213	8.03	7.08	9.60
1250	15.7	0.143	0.229	8.08	7.13	10.09
1300	15.6	0.131	0.250	8.14	7.16	10.57
1350	15.5	0.117	0.276	8.19	7.20	11.06
1375	----	0.109	0.295*	----	----	---
1400	15.2	0.147	0.216	8.23	7.24	11.56
1450	15.0	0.165	0.190	8.28	7.28	12.05
1500	15.0	0.177	0.178	8.32	7.31	12.55

* Extrapolated value.

Mn - ¼ STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	24.1	0.468	0.105	6.60	----	0.00
100	24.5	0.467	0.107	6.79	6.68	0.24
150	25.0	0.459	0.111	7.00	6.80	0.65
200	25.3	0.453	0.114	7.20	6.90	1.08
250	25.6	0.446	0.117	7.40	7.05	1.52
300	25.7	0.437	0.120	7.58	7.15	1.97
350	25.7	0.427	0.123	7.75	7.25	2.44
400	25.6	0.415	0.126	7.90	7.33	2.90
450	25.4	0.406	0.128	8.05	7.40	3.37
500	25.2	0.393	0.131	8.17	7.50	3.88
550	24.9	0.379	0.134	8.30	7.58	4.37
600	24.6	0.369	0.136	8.40	7.65	4.88
650	24.2	0.356	0.139	8.50	7.74	5.39
700	23.8	0.340	0.143	8.60	7.80	5.90
750	23.4	0.328	0.146	8.70	7.87	6.42
800	23.0	0.313	0.150	8.78	7.93	6.95
850	22.6	0.298	0.154	8.85	8.00	7.49
900	22.1	0.286	0.158	8.90	8.05	8.02
950	21.7	0.273	0.162	8.96	8.10	8.55
1000	21.2	0.259	0.167	9.00	8.15	9.10
1050	20.7	0.246	0.172	9.05	8.18	9.62
1100	20.2	0.231	0.178	9.08	8.23	10.17
1150	19.7	0.216	0.186	9.12	8.26	10.70
1200	19.2	0.200	0.196	9.15	8.30	11.26
1250	18.7	0.184	0.208	9.18	8.35	11.82
1300	18.0	0.166	0.224	9.20	8.37	12.36
1350	17.2	0.146	0.247	9.24	8.42	12.93
1400	15.8	0.095	0.330*	9.25	8.45	13.49
1450	15.5	0.133	0.230	9.28	8.48	14.04
1500	15.6	0.165	0.187	9.30	8.50	14.59

* Extrapolated value.

Mn - 1/4 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	19.6	0.381	0.105	7.02	----	0.00
100	20.0	0.380	0.107	7.13	7.06	0.25
150	20.4	0.376	0.111	7.29	7.16	0.69
200	20.8	0.373	0.114	7.45	7.25	1.13
250	21.1	0.369	0.117	7.60	7.34	1.58
300	21.3	0.363	0.120	7.74	7.43	2.05
350	21.4	0.357	0.123	7.88	7.50	2.52
400	21.4	0.347	0.126	8.01	7.58	3.00
450	21.4	0.341	0.128	8.13	7.63	3.48
500	21.3	0.332	0.131	8.25	7.70	3.97
550	21.2	0.323	0.134	8.36	7.77	4.48
600	21.0	0.316	0.136	8.46	7.83	4.98
650	20.9	0.306	0.139	8.55	7.90	5.50
700	20.7	0.295	0.143	8.63	7.94	6.00
750	20.4	0.286	0.146	8.71	8.00	6.53
800	20.2	0.275	0.150	8.78	8.05	7.06
850	19.9	0.263	0.154	8.84	8.10	7.58
900	19.6	0.254	0.158	8.90	8.14	8.11
950	19.3	0.244	0.162	8.95	8.19	8.65
1000	19.0	0.233	0.167	8.99	8.23	9.18
1050	18.7	0.222	0.172	9.03	8.27	9.72
1100	18.4	0.210	0.178	9.06	8.31	10.27
1150	18.0	0.198	0.186	9.07	8.34	10.81
1200	17.6	0.184	0.196	9.08	8.37	11.35
1250	17.3	0.169	0.208	9.09	8.41	11.90
1300	16.8	0.153	0.224	9.09	8.43	12.44
1350	16.0	0.136	0.247	9.09	8.46	13.00
1400	14.7	0.088	0.330*	9.09	8.48	13.54
1450	14.6	0.125	0.230	9.09	8.50	14.08
1500	14.8	0.257	0.187	9.09	8.52	14.62

* Extrapolated value.

Mn - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	23.3	0.455	0.105	7.02	----	0.00
100	23.6	0.451	0.107	7.13	7.06	0.25
150	24.1	0.444	0.111	7.29	7.16	0.69
200	24.6	0.437	0.114	7.45	7.25	1.13
250	24.6	0.429	0.117	7.60	7.34	1.58
300	24.7	0.420	0.120	7.74	7.43	2.05
350	24.7	0.409	0.123	7.88	7.50	2.52
400	24.6	0.398	0.126	8.01	7.58	3.00
450	24.4	0.388	0.128	8.13	7.63	3.48
500	24.2	0.377	0.131	8.25	7.70	3.97
550	23.9	0.364	0.134	8.36	7.77	4.48
600	23.5	0.353	0.136	8.46	7.83	4.98
650	23.2	0.340	0.139	8.55	7.90	5.50
700	22.8	0.328	0.143	8.63	7.94	6.00
750	22.4	0.314	0.146	8.71	8.00	6.53
800	22.0	0.300	0.150	8.78	8.05	7.06
850	21.6	0.286	0.154	8.84	8.10	7.58
900	21.2	0.274	0.158	8.90	8.14	8.11
950	20.8	0.262	0.162	8.95	8.19	8.65
1000	20.4	0.249	0.167	8.99	8.23	9.18
1050	19.9	0.237	0.172	9.03	8.27	9.72
1100	19.5	0.223	0.178	9.06	8.31	10.27
1150	19.0	0.209	0.186	9.07	8.34	10.81
1200	18.6	0.193	0.196	9.08	8.37	11.35
1250	18.1	0.178	0.208	9.09	8.41	11.90
1300	17.6	0.161	0.224	9.09	8.43	12.44
1350	17.0	0.142	0.247	9.09	8.46	13.00
1400	16.1	0.103	0.330*	9.09	8.48	13.54
1450	15.3	0.137	0.230	9.09	8.50	14.08
1500	15.5	0.164	0.187	9.09	8.52	14.62

* Extrapolated value.

Mn - 1/2 Mo - 1/4 Ni STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	22.7	0.437	0.106	7.02	----	0.00
100	23.1	0.436	0.108	7.13	7.06	0.25
150	23.5	0.433	0.111	7.29	7.16	0.69
200	23.8	0.429	0.114	7.45	7.25	1.13
250	24.1	0.423	0.117	7.60	7.34	1.58
300	24.2	0.415	0.119	7.74	7.43	2.05
350	24.2	0.405	0.122	7.88	7.50	2.52
400	24.1	0.394	0.125	8.01	7.58	3.00
450	24.0	0.383	0.128	8.13	7.63	3.48
500	23.8	0.371	0.131	8.25	7.70	3.97
550	23.5	0.358	0.134	8.36	7.77	4.48
600	23.2	0.346	0.137	8.46	7.83	4.98
650	22.9	0.334	0.140	8.55	7.90	5.50
700	22.5	0.322	0.143	8.63	7.94	6.00
750	22.2	0.310	0.146	8.71	8.00	6.53
800	21.8	0.297	0.150	8.78	8.05	7.06
850	21.4	0.283	0.154	8.84	8.10	7.58
900	21.0	0.272	0.158	8.90	8.14	8.11
950	20.6	0.257	0.164	8.95	8.19	8.65
1000	20.2	0.243	0.170	8.99	8.23	9.18
1050	19.8	0.230	0.176	9.03	8.27	9.72
1100	19.4	0.215	0.184	9.06	8.31	10.27
1150	18.9	0.200	0.193	9.07	8.34	10.81
1200	18.5	0.185	0.203	9.08	8.37	11.35
1250	18.0	0.171	0.215	9.09	8.41	11.90
1300	17.6	0.155	0.232	9.09	8.43	12.44
1350	17.0	0.136	0.256	9.09	8.46	13.00
1400	16.0	0.102	0.330*	9.09	8.48	13.54
1450	15.3	0.146	0.207	9.09	8.50	14.08
1500	15.4	0.166	0.184	9.09	8.52	14.62

* Extrapolated value.

Mn - 1/2 Mo - 1/2 Ni STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	22.3	0.429	0.106	7.02	----	0.00
100	22.6	0.427	0.108	7.13	7.06	0.25
150	23.1	0.424	0.111	7.29	7.16	0.69
200	23.4	0.420	0.114	7.45	7.25	1.13
250	23.7	0.415	0.117	7.60	7.34	1.58
300	23.8	0.408	0.119	7.74	7.43	2.05
350	23.8	0.399	0.122	7.88	7.50	2.52
400	23.8	0.389	0.125	8.01	7.58	3.00
450	23.7	0.378	0.128	8.13	7.63	3.48
500	23.5	0.366	0.131	8.25	7.70	3.97
550	23.2	0.354	0.134	8.36	7.77	4.48
600	23.0	0.342	0.137	8.46	7.83	4.98
650	22.7	0.330	0.140	8.55	7.90	5.50
700	22.3	0.319	0.143	8.63	7.94	6.00
750	22.0	0.308	0.146	8.71	8.00	6.53
800	21.7	0.295	0.150	8.78	8.05	7.06
850	21.3	0.281	0.154	8.84	8.10	7.58
900	20.9	0.269	0.158	8.90	8.14	8.11
950	20.5	0.256	0.164	8.95	8.19	8.65
1000	20.1	0.242	0.170	8.99	8.23	9.18
1050	19.7	0.229	0.176	9.03	8.27	9.72
1100	19.3	0.214	0.184	9.06	8.31	10.27
1150	18.9	0.200	0.193	9.07	8.34	10.81
1200	18.4	0.185	0.203	9.08	8.37	11.35
1250	18.0	0.171	0.215	9.09	8.41	11.90
1300	17.5	0.154	0.232	9.09	8.43	12.44
1350	16.6	0.136	0.256	9.09	8.46	13.00
1400	15.4	0.093	0.330*	9.09	8.48	13.54
1450	15.2	0.145	0.207	9.09	8.50	14.08
1500	15.4	0.166	0.184	9.09	8.52	14.62

* Extrapolated value.

Mn - 1/2 Mc - 3/4 Ni STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	21.8	0.419	0.106	7.02	----	0.00
100	22.1	0.418	0.108	7.13	7.06	0.25
150	22.6	0.415	0.111	7.29	7.16	0.69
200	22.9	0.411	0.114	7.45	7.25	1.13
250	23.2	0.406	0.117	7.60	7.34	1.58
300	23.4	0.400	0.119	7.74	7.43	2.05
350	23.4	0.392	0.122	7.88	7.50	2.52
400	23.4	0.383	0.125	8.01	7.58	3.00
450	23.3	0.372	0.128	8.13	7.63	3.48
500	23.2	0.361	0.131	8.25	7.70	3.97
550	22.9	0.349	0.134	8.36	7.77	4.48
600	22.7	0.338	0.137	8.46	7.83	4.98
650	22.4	0.326	0.140	8.55	7.90	5.50
700	22.1	0.315	0.143	8.63	7.94	6.00
750	21.8	0.304	0.146	8.71	8.00	6.53
800	21.5	0.292	0.150	8.78	8.05	7.[illegible]
850	21.1	0.279	0.154	8.84	8.10	7.[illegible]
900	20.8	0.267	0.158	8.90	8.14	8.11
950	20.4	0.254	0.164	8.95	8.19	8.65
1000	20.0	0.240	0.170	8.99	8.23	9.18
1050	19.6	0.227	0.176	9.03	8.27	9.72
1100	19.2	0.213	0.184	9.06	8.31	10.27
1150	18.8	0.199	0.193	9.07	8.34	10.81
1200	18.4	0.185	0.203	9.08	8.37	11.35
1250	17.9	0.170	0.215	9.09	8.41	11.90
1300	17.4	0.154	0.232	9.09	8.43	12.44
1350	16.6	0.136	0.256	9.09	8 46	13.00
1400	15.4	0.093	0.330*	9.09	8.48	13.54
1450	15.2	0.146	0.207	9.09	8.50	14.08
1500	15.4	0 166	0.184	9.09	8.52	14.62

* Extrapolated value.

1/2 Ni - 1/2 Mo-V STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	21.8	0.420	0.106	6.41	----	0.00
100	22.0	0.414	0.109	6.53	6.50	0.24
150	22.2	0.406	0.112	6.73	6.57	0.64
200	22.2	0.396	0.115	6.93	6.67	1.04
250	22.2	0.386	0.118	7.12	6.77	1.45
300	22.1	0.377	0.121	7.30	6.87	1.90
350	22.1	0.368	0.124	7.49	6.98	2.36
400	22.0	0.359	0.127	7.66	7.07	2.81
450	21.8	0.349	0.129	7.84	7.15	3.25
500	21.7	0.340	0.132	8.03	7.25	3.74
550	21.5	0.331	0.134	8.21	7.34	4.22
600	21.2	0.321	0.137	8.35	7.42	4.68
650	21.0	0.311	0.140	8.51	7.52	5.23
700	20.7	0.301	0.143	8.64	7.59	5.74
750	20.5	0.291	0.146	8.78	7.68	6.26
800	20.2	.282	0.150	8.90	7.76	6.80
850	19.9	.272	0.153	9.04	7.85	7.30
900	19.7	0.262	0.157	9.13	7.89	7.86
950	19.4	0.253	0.161	9.22	7.98	8.41
1000	19.1	0.242	0.165	9.30	8.05	8.99
1050	18.8	0.231	0.171	9.39	8.13	9.56
1100	18.5	0.219	0.178	9.45	8.19	10.13
1150	18.1	0.206	0.186	9.51	8.27	10.72
1200	17.7	0.190	0.197	9.56	8.32	11.28
1250	17.2	0.174	0.209	9.59	8.36	11.83
1300	16.6	0.156	0.225	9.62	8.37	12.35
1350	15.4	0.131	0.249	----	8.30	12.80**
1390	----	----	0.310	----	----	----
1400	15.1	0.123	0.261	----	8.14	13.00**
1450	15.0	0.170	0.188	----	7.90	13.08**
1500	15.0	0.189	0.168	----	7.56	12.97**
1550	15.1	0.204	0.156	----	7.11	12.62**
1600	15.2	0.227	0.148	----	6.94	12.7[illegible]**
1650	----	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

1/2 Ni - 1/2 Cr - 1/4 Mo-V STEEL

Temperature (F)	Thermal Conductivjty (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivjty (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linea Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	24.3	0.475	0.106	6.41	----	0.00
100	24.5	0.468	0.109	6.53	6.50	0.24
150	24.6	0.457	0.112	6.73	6.57	0.64
200	24.7	0.445	0.115	6.93	6.67	1.04
250	24.6	0.434	0.118	7.12	6.77	1.45
300	24.5	0.423	0.121	7.30	6.87	1.90
350	24.4	0.411	0.124	7.49	6.98	2.36
400	24.1	0.399	0.127	7.66	7.07	2.81
450	23.9	0.388	0.129	7.84	7.15	3.25
500	23.6	0.376	0.132	8.03	7.25	3.74
550	23.3	0.364	0.134	8.21	7.34	4.22
600	22.9	0.352	0.137	8.35	7.42	4.68
650	22.6	0.339	0.140	8.51	7.52	5.23
700	22.2	0.327	0.143	8.64	7.59	5.74
750	21.8	0.315	0.146	8.78	7.68	6.26
800	21.5	0.304	0.150	8.90	7.76	6.80
850	21.1	0.293	0.153	9.04	7.85	7.30
900	20.8	0.281	0.157	9.13	7.89	7.86
950	20.4	0.269	0.161	9.22	7.98	8.41
1000	20.0	0.257	0.165	9.30	8.05	8.99
1050	19.6	0.244	0.171	9.39	8.13	9.56
1100	19.2	0.231	0.178	9.45	8.19	10.13
1150	18.8	0.215	0.186	9.51	8.27	10.72
1200	18.3	0.199	0.197	9.56	8.32	11.28
1250	17.7	0.181	0.209	9.59	8.36	11.83
1300	16.9	0.161	0.225	9.62	8.37	12.35
1350	15.7	0.135	0.249	----	8.30	12.80**
1390	----	----	0.310	----	----	----
1400	15.3	0.125	0.261	----	8.14	13.00**
1450	15.2	0.174	0.188	----	7.90	13.08**
1500	15.1	0.193	0.16[illegible]	----	7.56	12.97**
1550	15.1	0.209	0.156	----	7.11	12.62**
1600	15.3	0.221	0.148	----	6.94	12.74**
1650	----	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

3/4 Ni - 1/2 Mo-Cr-V STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	21.8	0.420	0.106	6.41	---	0.00
100	22.0	0.415	0.109	6.53	6.50	0.24
150	22.3	0.407	0.112	6.73	6.57	0.64
200	22.4	0.399	0.115	6.93	6.67	1.04
250	22.4	0.390	0.118	7.12	6.77	1.45
300	22.4	0.382	0.121	7.30	6.87	1.90
350	22.4	0.373	0.124	7.49	6.98	2.36
400	22.3	0.364	0.127	7.66	7.07	2.81
450	22.1	0.355	0.129	7.84	7.15	3.25
500	22.0	0.345	0.132	8.03	7.25	3.74
550	21.8	0.335	0.134	8.21	7.34	4.22
600	21.5	0.325	0.137	8.35	7.42	4.68
650	21.3	0.315	0.140	8.51	7.52	5.23
700	21.0	0.305	0.143	8.64	7.59	5.74
750	20.7	0.295	0.146	8.78	7.68	6.26
800	20.4	0.285	0.150	8.90	7.76	6.81
850	20.1	0.275	0.153	9.04	7.85	7.30
900	19.8	0.265	0.157	9.13	7.89	7.86
950	19.5	0.255	0.161	9.22	7.98	8.41
1000	19.2	0.244	0.165	9.30	8.05	8.99
1050	18.9	0.232	0.171	9.39	8.13	9.56
1100	18.5	0.220	0.178	9.45	8.19	10.13
1150	18.2	0.206	0.186	9.51	8.27	10.72
1200	17.8	0.190	0.197	9.56	8.32	11.28
1250	17.3	0.175	0.209	9.59	8.36	11.83
1300	16.6	0.156	0.225	9.62	8.37	12.35
1350	15.5	0.131	0.249	----	8.30	12.80**
1390	----	----	0.310	----	----	
1400	15.1	0.123	0.261	----	8.14	13.00**
1450	15.0	0.169	0.188	----	7.90	13.08**
1500	15.0	0.189	0.168	----	7.56	12.97**
1550	15.0	0.203	0.156	----	7.11	12.62**
1600	15.1	0.216	0.148	----	6.94	12.74**
1650	----	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

3/4 Ni - 1/2 Cu-Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (Btu lb^{-1} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-6} F^{-1})	Expansion (10^{-2} in ft^{-1})
70	27.7	0.534	0.106	6.41	----	0.00
100	27.7	0.523	0.109	6.53	6.50	0.24
150	27.6	0.506	0.112	6.73	6.57	0.64
200	27.4	0.488	0.115	6.93	6.67	1.04
250	27.2	0.472	0.118	7.12	6.77	1.45
300	26.9	0.457	0.121	7.30	6.87	1.90
350	26.5	0.442	0.124	7.49	6.98	2.36
400	26.2	0.427	0.127	7.66	7.07	2.81
450	25.8	0.412	0.129	7.84	7.15	3.25
500	25.3	0.397	0.132	8.03	7.25	3.74
550	24.8	0.382	0.134	8.21	7.34	[illegible]
600	24.3	0.368	0.137	8.35	7.42	[illegible]
650	23.8	0.353	0.140	8.51	7.52	[illegible]
700	23.3	0.339	0.143	8.64	7.59	5.74
750	22.9	0.326	0.146	8.78	7.68	6.26
800	22.4	0.312	0.150	8.90	7.76	6.80
850	22.0	0.300	0.153	9.04	7.85	7.30
900	21.5	0.287	0.157	9.13	7.89	7.86
950	21.1	0.275	0.161	9.22	7.98	8.41
1000	20.7	0.262	0.165	9.[illegible]	8.05	8.99
1050	20.2	0.249	0.171	9.39	8.13	9.56
1100	19.8	0.234	0.178	9.45	8.19	10.13
1150	19.3	0.219	0.186	9.51	8.27	10.72
1200	18.7	0.201	0.197	9.56	8.32	11.28
1250	18.1	0.183	0.209	[illegible].59	8 36	11.83
1300	17.3	0.163	0.225	9.62	8.37	12.35
1350	15.9	0.135	0.249	----	8.30	12.60**
1390	----	----	0.310	----	----	----
1400	15.5	0.126	0.261	----	8.14	13.00**
1450	15.4	0.174	0.188	----	7.90	13.08**
1500	15.3	0.193	0.168	----	7.56	12.97**
1550	15.4	0.208	0.156	----	7.11	12.62**
1600	15.5	0.[illegible]	0.148	----	6.94	12.74**
1650	----	--	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

3/4 Ni - 1/2 Mo - 1/3 Cr-V STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	23.6	0.454	0.106	6.41	----	0.00
100	23.7	0.447	0.109	6.53	6.50	0.24
150	23.9	0.437	0.112	6.73	6.57	0.64
200	24.0	0.427	0.115	6.93	6.67	1.04
250	24.0	0.416	0.118	7.12	6.77	1.45
300	23.9	0.406	0.121	7.30	6.87	1.90
350	23.7	0.396	0.124	7.49	6.98	2.36
400	23.6	0.385	0.127	7.66	7.07	2.81
450	23.3	0.374	0.129	7.84	7.15	3.25
500	23.1	0.362	0.132	8.03	7.25	3.74
550	22.7	0.350	0.134	8.21	7.34	4.22
600	22.4	0.339	0.137	8.35	7.42	4.68
650	22.1	0.327	0.140	8.51	7.52	5.23
700	21.7	0.316	0.143	8.64	7.59	5.74
750	21.4	0.304	0.146	8.78	7.68	6.26
800	21.0	0.293	0.150	8.90	7.76	6.80
850	20.7	0.282	0.153	9.04	7.85	7.30
900	20.3	0.271	0.157	9.13	7.89	7.86
950	20.0	0.260	0.161	9.22	7.98	8.41
1000	19.6	0.249	0.165	9.30	8.05	8.99
1050	19.2	0.237	0.171	9.39	8.13	9.56
1100	18.9	0.223	0.178	9.45	8.19	10.13
1150	18.4	0.209	0.186	9.51	8.27	10.72
1200	18.0	0.193	0.197	9.56	8.32	11.28
1250	17.5	0.177	0.209	9.59	8.36	11.83
1300	16.7	0.157	0.225	9.62	8.37	12.35
1350	15.6	0.132	0.249	----	8.30	12.80**
1390	----	----	0.310	----	----	----
1400	15.2	0.123	0.261	----	8.14	13.00**
1450	15.1	0.170	0.188	----	7.90	13.08**
1500	15.0	0.189	0.168	----	7.56	12.97**
1550	15.1	0.204	0.156	----	7.11	12.62**
1600	15.2	0.217	0.148	----	6.94	12.74**
1650	----	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

3/4 Ni - 1/2 Cr - 1/2 Mo-V STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	21.8	0.420	0.106	6.41	----	0.00
100	22.0	0.415	0.109	6.53	6.50	0.24
150	22.3	0.407	0.112	6.73	6.57	0.64
200	22.4	0.399	0.115	6.93	6.67	1.04
250	22.4	0.390	0.118	7.12	6.77	1.45
300	22.4	0.382	0.121	7.30	6.87	1.90
350	22.4	0.373	0.124	7.49	6.98	2.36
400	22.3	0.364	0.127	7.66	7.07	2.81
450	22.1	0.355	0.129	7.84	7.15	3.25
500	22.0	0.345	0.132	8.03	7.25	3.74
550	21.8	0.335	0.134	8.21	7.34	4.22
600	21.5	0.325	0.137	8.35	7.42	4.68
650	21.3	0.315	0.140	8.51	7.52	5.23
700	21.0	0.305	0.143	8.64	7.59	5.74
750	20.7	0.295	0.146	8.78	7.68	6.26
800	20.4	0.285	0.150	8.90	7.76	6.80
850	20.1	0.275	0.153	9.04	7.85	7.30
900	19.8	0.265	0.157	9.13	7.89	7.86
950	19.5	0.255	0.161	9.22	7.98	8.41
1000	19.2	0.244	0.165	9.30	8.05	8.99
1050	18.9	0.232	0.171	9.39	8.13	9.56
1100	18.5	0.220	0.178	9.45	8.19	10.13
1150	18.2	0.206	0.186	9.51	8.27	10.72
1200	17.8	0.190	0.197	9.56	8.32	11.28
1250	17.3	0.175	0.209	9.59	8.36	11.83
1300	16.6	0.156	0.225	9.62	8.37	12.35
1350	15.5	0.131	0.249	----	8.30	12.80**
1390	----	----	0.310	----	----	----
1400	15.1	0.123	0.261	----	8.14	13.00**
1450	15.0	0.169	0.188	----	7.90	13.08**
1500	15.0	0.189	0.168	----	7.56	12.97**
1550	15.0	0.203	0.156	----	7.11	12.62**
1600	15.1	0.216	0.148	----	6.94	12.74**
1650	----	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

3/4 Ni - 1 Mo - 3/4 Cr STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	22.1	0.427	0.106	6.41	----	0.00
100	22.3	0.422	0.109	6.53	6.50	0.24
150	22.5	0.414	0.112	6.73	6.57	0.64
200	22.6	0.405	0.115	6.93	6.67	1.04
250	22.7	0.396	0.118	7.12	6.77	1.45
300	22.7	0.388	0.121	7.30	6.87	1.90
350	22.6	0.379	0.124	7.49	6.98	2.36
400	22.5	0.369	0.127	7.66	7.07	2.81
450	22.4	0.360	0.129	7.84	7.15	3.25
500	22.2	0.349	0.132	8.03	7.25	3.74
550	21.9	0.339	0.134	8.21	7.34	4.22
600	21.6	0.328	0.137	8.35	7.42	4.68
650	21.3	0.317	0.140	8.51	7.52	5.23
700	21.0	0.307	0.143	8.64	7.59	5.74
750	20.7	0.296	0.146	8.78	7.68	6.26
800	20.4	0.286	0.150	8.90	7.76	6.80
850	20.1	0.276	0.153	9.04	7.85	7.30
900	19.8	0.265	0.157	9.13	7.89	7.86
950	19.4	0.255	0.161	9.22	7.98	8.41
1000	19.1	0.244	0.165	9.30	8.05	8.99
1050	18.8	0.232	0.171	9.39	8.13	9.56
1100	18.4	0.219	0.178	9.45	8.19	10.13
1150	18.0	0.205	0.186	9.51	8.27	10.77
1200	17.6	0.190	0.197	9.56	8.32	11.28
1250	17.1	0.174	0.209	9.59	8.36	11.83
1300	16.4	0.155	0.225	9.62	8.37	12.35
1350	15.3	0.131	0.249	----	8.30	12.80**
1390	----	----	0.310	----	----	----
1400	15.C	0.123	0.261	----	8.14	13.00**
1450	14.9	0.169	C.188	----	7.90	13.08**
1500	14.8	0.188	0.168	----	7.56	12.97**
1550	14.9	0.202	0.156	----	7.11	12.52**
1600	15.0	0.215	0.148	----	6.94	12.74**
1650	----	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

1 Ni - 1/2 Cr - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	23.7	0.459	0.106	6.41	----	0.00
100	23.9	0.454	0.109	6.53	6.50	0.24
150	24.1	0.443	0.112	6.73	6.57	0.64
200	24.2	0.432	0.115	6.93	6.67	1.04
250	24.2	0.422	0.118	7.12	6.77	1.45
300	24.1	0.411	0.121	7.30	6.87	1.90
350	24.0	0.401	0.124	7.49	6.98	2.36
400	23.8	0.390	0.127	7.66	7.07	2.81
450	23.5	0.378	0.129	7.84	7.15	3.25
500	23.2	0.366	0.132	8.03	7.25	3.74
550	22.9	0.355	0.134	8.21	7.34	4.22
600	22.6	0.343	0.137	8.35	7.42	4.68
650	22.2	0.331	0.140	8.51	7.52	5.23
700	21.9	0.319	0.143	8.64	7.59	5.74
750	21.5	0.308	0.146	8.78	7.68	6.26
800	21.2	0.297	0.150	8.90	7.76	6.80
850	20.8	0.286	0.153	9.04	7.85	7.30
900	20.5	0.274	0.157	9.13	7.89	7.86
950	20.1	0.263	0.161	9.22	7.98	8.41
1000	19.7	0.251	0.165	9.30	8.05	8.99
1050	19.3	0.239	0.171	9.35	8.13	9.56
1100	18.9	0.225	0.178	9.45	8.19	10.13
1150	18.5	0.211	0.186	9.51	8.27	10.72
1200	18.0	0.194	0.197	9.56	8.32	11.28
1250	17.5	0.178	0.209	9.59	8.36	11.83
1300	16.8	0.158	0.225	9.62	8.37	12.35
1350	15.6	0.133	0.249	----	8.30	12.80**
1390	----	----	0.310	----	----	----
1400	15.2	0.124	0.261	----	8.14	13.00**
1450	15.1	0.171	0.188	----	7.90	13.08**
1500	15.0	0.190	0.168	----	7.56	12.97**
1550	15.1	0.205	0.156	----	7.11	12.62**
1600	15.1	0.217	0.148	----	6.94	12.74**
1650	----	----	----	----	6.92	13.13
1700	----	----	----	----	7.04	13.76

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

1 1/4 Ni - 1 Cr - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	21.3	0.403	0.108	6.20	----	0.00
100	21.7	0.402	0.110	6.37	6.27	0.23
150	22.2	0.400	0.113	6.62	6.41	0.62
200	22.6	0.396	0.117	6.85	6.54	1.02
250	22.9	0.391	0.120	7.05	6.65	1.44
300	23.2	0.385	0.122	7.25	6.78	1.87
350	23.3	0.378	0.125	7.43	6.88	2.31
400	23.3	0.371	0.128	7.59	6.96	2.76
450	23.2	0.362	0.131	7.75	7.07	3.22
500	23.1	0.354	0.133	7.90	7.16	3.70
550	22.9	0.344	0.136	8.04	7.24	4.17
600	22.7	0.334	0.139	8.16	7.32	4.66
650	22.4	0.323	0.143	8.28	7.41	5.16
700	22.2	0.312	0.146	8.39	7.47	5.65
750	21.9	0.300	0.149	8.49	7.55	6.16
800	21.6	0.289	0.152	8.57	7.61	6.67
850	21.2	0.277	0.156	8.65	7.68	7.19
900	20.9	0.266	0.160	8.72	7.74	7.71
950	20.6	0.254	0.165	8.77	7.80	8.24
1000	20.2	0.241	0.171	8.82	7.85	8.76
1050	19.8	0.229	0.177	8.86	7.90	9.29
1100	19.4	0.214	0.185	8.91	7.95	9.83
1150	19.0	0.197	0.196	8.95	7.99	10.36
1200	18.5	0.181	0.209	9.00	8.03	10.89
1250	18.1	0.164	0.226	9.04	8.08	11.44**
1300	17.5	0.144	0.251	----	8.07	11.91**
1350	16.7	0.121	0.290	----	7.98	12.26**
1370	----	0.108	0.310*	----	----	----
1400	15.5	0.164	0.187	----	7.69	12.27**
1450	15.3	0.182	0.166	----	7.19	11.91**
1500	15.4	0.197	0.155	----	6.74	11.57**

* Extrapolated value.

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

1 3/4 Ni - 3/4 Cr - 1/4 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	20.5	0.391	0.108	6.20	----	0.00
100	20.7	0.388	0.110	6.37	6.27	0.23
150	21.0	0.382	0.113	6.62	6.41	0.62
200	21.3	0.376	0.117	6.85	6.54	1.03
250	21.4	0.370	0.120	7.05	6.65	1.44
300	21.5	0.363	0.122	7.25	6.78	1.87
350	21.6	0.356	0.125	7.43	6.88	2.31
400	21.5	0.349	0.128	7.59	6.98	2.76
450	21.5	0.341	0.131	7.75	7.07	3.22
500	21.4	0.333	0.133	7.90	7.16	3.69
550	21.3	0.324	0.136	8.04	7.24	4.17
600	21.1	0.315	0.139	8.16	7.32	4.66
650	20.9	0.305	0.143	8.28	7.41	5.15
700	20.7	0.296	0.146	8.39	7.47	5.65
750	20.5	0.288	0.149	8.49	7.55	6.16
800	20.3	0.279	0.152	8.57	7.61	6.67
850	20.1	0.269	0.156	8.65	7.68	7.19
900	19.8	0.259	0.160	8.72	7.74	7.71
950	19.5	0.249	0.165	8.77	7.80	8.23
1000	19.3	0.237	0.171	8.82	7.85	8.76
1050	19.0	0.225	0.177	8.86	7.90	9.29
1100	18.6	0.212	0.185	8.91	7.95	9.82
1150	18.3	0.197	0.196	8.95	7.99	10.36
1200	17.9	0.181	0.209	9.00	8.03	10.89
1250	17.3	0.162	0.226	9.04	8.08	11.44**
1300	16.7	0.141	0.251	----	8.07	11.92**
1340	----	----	0.310	----	----	----
1350	15.5	0.135	0.243	----	7.98	12.25**
1400	15.3	0.173	0.187	----	7.69	12.28**
1450	15.2	0.193	0.166	----	7.19	11.90**
1500	15.2	0.207	0.155	----	6.74	11.57**
1550	15.2	0.220	0.147	----	6.69	11.88
1600	15.3	0.230	0.142	----	6.72	12.34
1650	----	----	----	----	6.78	12.86

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

2 Ni - 1 Cu STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	18.4	0.350	0.108	6.20	----	0.00
100	18.7	0.348	0.110	6.37	6.27	0.23
150	19.1	0.345	0.113	6.62	6.41	0.62
200	19.4	0.341	0.117	6.85	6.54	1.03
250	19.7	0.337	0.120	7.05	6.65	1.44
300	19.8	0.333	0.122	7.25	6.78	1.87
350	19.9	0.327	0.125	7.43	6.88	2.31
400	20.0	0.321	0.128	7.59	6.98	2.76
450	20.0	0.315	0.131	7.75	7.07	3.22
500	19.9	0.308	0.133	7.90	7.16	3.69
550	19.8	0.301	0.136	8.04	7.24	4.17
600	19.7	0.293	0.139	8.16	7.32	4.66
650	19.6	0.284	0.143	8.28	7.41	5.15
700	19.4	0.276	0.146	8.39	7.47	5.65
750	19.2	0.269	0.149	8.49	7.55	6.16
800	19.1	0.260	0.152	8.57	7.61	6.67
850	18.9	0.252	0.156	8.65	7.68	7.19
900	18.6	0.243	0.160	8.72	7.74	7.71
950	18.4	0.234	0.165	8.77	7.80	8.23
1000	18.2	0.223	0.171	8.82	7.85	8.76
1050	17.9	0.212	0.177	8.86	7.90	9.29
1100	17.7	0.200	0.185	8.91	7.95	9.82
1150	17.3	0.186	0.196	8.95	7.99	10.36
1200	16.9	0.170	0.209	9.00	8.03	10.89
1250	16.5	0.154	0.226	9.04	8.08	11.44**
1300	15.9	0.134	0.251	----	8.07	11.92**
1340	----	----	0.310	----	----	----
1350	15.1	0.131	0.243	----	7.98	12.25**
1400	14.8	0.167	0.187	----	7.69	12.28**
1450	14.7	0.186	0.166	----	7.19	11.90**
1500	14.7	0.200	0.155	----	6.74	11.57**
1550	14.8	0.212	0.147	----	6.69	11.88
1600	14.9	0.222	0.142	----	6.72	12.34
1650	----	----	----	----	6.78	12.86

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

2 Ni - 3/4 Cr - 1/4 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	19.5	0.377	0.106	6.20	----	0.00
100	19.9	0.374	0.110	6.37	6.27	0.23
150	20.4	0.367	0.113	6.62	6.41	0.62
200	20.8	0.360	0.117	6.85	6.54	1.02
250	21.1	0.354	0.120	7.05	6.65	1.44
300	21.3	0.347	0.122	7.25	6.78	1.87
350	21.5	0.340	0.125	7.43	6.88	2.31
400	21.6	0.333	0.128	7.59	6.98	2.76
450	21.6	0.326	0.131	7.75	7.07	3.22
500	21.6	0.319	0.133	7.90	7.16	3.70
550	21.5	0.312	0.136	8.04	7.24	4.17
600	21.4	0.304	0.139	8.16	7.32	4.66
650	21.2	0.296	0.143	8.28	7.41	5.16
700	21.0	0.288	0.146	8.39	7.47	5.65
750	20.8	0.279	0.149	8.49	7.55	6.16
800	20.6	0.270	0.152	8.57	7.61	6.67
850	20.3	0.261	0.156	8.65	7.68	7.19
900	20.0	0.252	0.160	8.72	7.74	7.71
950	19.8	0.242	0.165	8.77	7.80	8.24
1000	19.4	0.232	0.171	8.82	7.85	8.76
1050	19.1	0.221	0.177	8.86	7.90	9.29
1100	18.8	0.210	0.185	8.91	7.95	9.83
1150	18.4	0.197	0.196	8.95	7.99	10.36
1200	18.0	0.184	0.209	9.00	8.03	10.89
1250	17.6	0.171	0.226	9.04	8.08	11.44**
1300	16.8	0.150	0.251	----	8.07	11.91**
1340	----	0.125	0.310*	----	----	----
1350	15.5	0.139	0.243	----	7.98	12.26**
1400	15.0	0.178	0.187	----	7.69	12.27**
1450	14.9	0.195	0.166	----	7.19	11.91**
1500	15.0	0.203	0.155	----	6.74	11.57**

* Extrapolated value.

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

2 Ni - 3/4 Cr - 1/3 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	19.3	0.377	0.108	6.20	----	0.00
100	19.7	0.374	0.110	6.37	6.27	0.23
150	20.2	0.367	0.113	6.62	6.41	0.62
200	20.6	0.360	0.117	6.85	6.54	1.02
250	21.0	0.354	0.120	7.05	6.65	1.44
300	21.2	0.347	0.122	7.25	6.78	1.87
350	21.3	0.340	0.125	7.43	6.88	2.31
400	21.4	0.333	0.128	7.59	6.98	2.76
450	21.4	0.326	0.131	7.75	7.07	3.22
500	21.4	0.319	0.133	7.90	7.16	3.70
550	21.3	0.312	0.136	8.04	7.24	4.17
600	21.2	0.304	0.139	8.16	7.32	4.66
650	21.1	0.296	0.143	8.28	7.41	5.16
700	20.9	0.288	0.146	8.39	7.47	5.65
750	20.7	0.279	0.149	8.49	7.55	6.16
800	20.5	0.270	0.152	8.57	7.61	6.67
850	20.2	0.261	0.156	8.65	7.68	7.19
900	20.0	0.252	0.160	8.72	7.74	7.71
950	19.7	0.242	0.165	8.77	7.80	8.24
1000	19.4	0.232	0.171	8.82	7.85	8.76
1050	19.0	0.221	0.177	8.86	7.90	9.29
1100	18.7	0.210	0.185	8.91	7.95	9.83
1150	18.3	0.197	0.196	8.95	7.99	10.36
1200	18.0	0.184	0.209	9.00	8.03	10.89
1250	17.6	0.171	0.226	9.04	8.08	11.44**
1300	17.2	0.150	0.251	----	8.07	11.91**
1340	----	0.125	0.310*	----	----	----
1350	16.3	0.139	0.243	----	7.98	12.26**
1400	15.0	0.178	0.187	----	7.69	12.27**
1450	14.8	0.195	0.166	----	7.19	11.91**
1500	15.0	0.203	0.155	----	6.74	11.57**

* Extrapolated value.

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

2 1/2 Ni STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	25.9	0.491	0.108	6.20	----	0.00
100	26.0	0.485	0.110	6.37	6.27	0.23
150	26.3	0.474	0.113	6.62	6.41	0.62
200	26.3	0.463	0.117	6.85	6.54	1.03
250	26.3	0.451	0.120	7.05	6.65	1.44
300	26.2	0.439	0.122	7.25	6.78	1.87
350	26.0	0.427	0.125	7.43	6.88	2.31
400	25.7	0.413	0.128	7.59	6.98	2.76
450	25.4	0.400	0.131	7.75	7.07	3.22
500	25.0	0.386	0.133	7.90	7.16	3.69
550	24.6	0.372	0.136	8.04	7.24	4.17
600	24.1	0.358	0.139	8.16	7.32	4.66
650	23.7	0.344	0.143	8.28	7.41	5.15
700	23.3	0.330	0.146	8.39	7.47	5.65
750	22.9	0.318	0.149	8.49	7.55	6.16
800	22.4	0.306	0.152	8.57	7.61	6.67
850	22.0	0.294	0.156	8.65	7.68	7.19
900	21.6	0.281	0.160	8.72	7.74	7.71
950	21.1	0.268	0.165	8.77	7.80	8.23
1000	20.7	0.253	0.171	8.82	7.85	8.76
1050	20.2	0.239	0.177	8.86	7.90	9.29
1100	19.7	0.223	0.185	8.91	7.95	9.82
1150	19.2	0.206	0.196	8.95	7.99	10.36
1200	18.6	0.187	0.209	9.00	8.03	10.89
1250	18.0	0.168	0.226	9.04	8.08	11.44**
1300	17.1	0.144	0.251	----	8.07	11.92**
1340	----	----	0.310	----	----	----
1350	16.0	0.139	0.243	----	7.98	12.25**
1400	15.6	0.176	0.187	----	7.69	12.28**
1450	15.4	0.196	0.166	----	7.19	11.90**
1500	15.4	0.209	0.155	----	6.74	11.57**
1550	15.4	0.221	0.147	----	6.69	11.88
1600	15.5	0.231	0.142	----	6.72	12.34
1650	----	----	----	----	6.78	12.86

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

3 1/2 Ni STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	22.9	0.436	0.108	6.20	----	0.00
100	23.2	0.432	0.110	6.37	6.27	0.23
150	23.6	0.426	0.113	6.62	6.41	0.62
200	23.8	0.418	0.117	6.85	6.54	1.03
250	24.0	0.411	0.120	7.05	6.65	1.44
300	24.1	0.403	0.122	7.25	6.78	1.87
350	24.0	0.394	0.125	7.43	6.88	2.31
400	23.9	0.384	0.128	7.59	6.98	2.76
450	23.7	0.373	0.131	7.75	7.07	3.22
500	23.4	0.363	0.133	7.90	7.16	3.69
550	23.2	0.351	0.136	8.04	7.24	4.17
600	22.9	0.340	0.139	8.16	7.32	4.66
650	22.6	0.327	0.143	8.28	7.41	5.15
700	22.3	0.316	0.146	8.39	7.47	5.65
750	21.9	0.306	0.149	8.49	7.55	6.16
800	21.6	0.295	0.152	8.57	7.61	6.67
850	21.2	0.284	0.156	8.65	7.68	7.19
900	20.9	0.272	0.160	8.72	7.74	7.71
950	20.5	0.260	0.165	8.77	7.80	8.23
1000	20.1	0.246	0.171	8.82	7.85	8.76
1050	19.7	0.232	0.177	8.86	7.90	9.29
1100	19.2	0.217	0.185	8.91	7.95	9.82
1150	18.7	0.201	0.196	8.95	7.99	10.36
1200	18.2	0.183	0.209	9.00	8.03	10.89
1250	17.6	0.164	0.226	9.04	8.08	11.44**
1300	16.9	0.141	0.251	----	8.07	11.92**
1340	----	----	0.310	----	----	----
1350	15.8	0.137	0.243	----	7.98	12.25**
1400	15.5	0.174	0.187	----	7.69	12.28**
1450	15.4	0.194	0.166	----	7.19	11.90**
1500	15.3	0.208	0.155	----	6.74	11.57**
1550	15.4	0.220	0.147	----	6.69	11.88
1600	15.5	0.230	0.142	----	6.72	12.34
1650	----	----	----	----	6.78	12.86

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

3 1/2 Ni - 1 3/4 Cr - 1/2 Mo-V STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	21.9	0.418	0.108	6.20	----	0.00
100	22.2	0.415	0.110	6.37	6.27	0.23
150	22.7	0.411	0.113	6.62	6.41	0.62
200	23.0	0.406	0.117	6.85	6.54	1.03
250	23.3	0.401	0.120	7.05	6.65	1.44
300	23.4	0.394	0.122	7.25	6.78	1.87
350	23.4	0.386	0.125	7.43	6.88	2.31
400	23.3	0.377	0.128	.59	6.98	2.76
450	23.1	0.367	0.131	7.75	7.07	3.22
500	22.9	0.357	0.133	7.90	7.16	3.69
550	22.7	0.346	0.136	8.04	7.24	4.17
600	22.4	0.335	0.139	8.16	7.32	4.66
650	22.1	0.323	0.143	8.28	7.41	5.15
700	21.8	0.312	0.146	8.39	7.47	5.65
750	21.5	0.302	0.149	8.49	7.55	6.16
800	21.2	0.291	0.152	8.57	7.61	6.67
850	20.9	0.280	0.156	8.65	7.68	7.19
900	20.5	0.269	0.160	8.72	7.74	7.71
950	20.1	0.257	0.165	8.77	7.80	8.23
1000	19.8	0.243	0.171	8.82	7.85	8.76
1050	19.4	0.230	0.177	8.86	7.90	9.29
1100	18.9	0.215	0.185	8.91	7.95	9.82
1150	18.4	0.199	0.196	8.95	7.99	10.36
1200	17.9	0.182	0.209	9.00	8.03	10.89
1250	17.4	0.163	0.226	9.04	8.06	11.44**
1300	16.7	0.141	0.251	----	8.07	11.92**
1340	----	----	0.310	----	----	----
1350	15.7	0.137	0.243	----	7.98	12.25**
1400	15.3	0.174	0.187	----	7.69	12.28**
1450	15.2	0.194	0.166	----	7.19	11.90**
1500	15.2	0.208	0.155	----	6.74	11.57**
1550	15.2	0.219	0.147	----	6.69	11.88
1600	15.3	0.229	0.142	----	6.72	12.34
1650	----	----	----	----	6.78	12.86

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

5 Ni - 1/4 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear (10^{-2} in ft^{-1})
70	19.4	0.367	0.108	6.20	----	0.00
00	19.7	0.366	0.110	6.34	6.27	0.23
150	20.2	0.364	0.114	6.55	6.41	0.62
200	20.7	0.361	0.117	6.74	6.50	1.01
250	21.0	0.357	0.120	6.90	6.59	1.42
300	21.2	0.353	0.123	7.06	6.68	1.84
350	21.4	0.348	0.126	7.21	6.76	2.27
400	21.4	0.341	0.129	7.35	6.84	2.71
450	21.4	0.334	0.131	7.50	6.92	3.15
500	21.3	0.326	0.134	7.63	6.99	3.61
550	21.2	0.318	0.137	7.76	7.06	4.07
600	21.1	0.310	0.140	7.89	7.14	4.54
650	20.9	0.301	0.144	8.00	7.21	5.01
700	20.8	0.292	0.147	8.12	7.27	5.49
750	20.6	0.283	0.150	8.23	7.34	5.99
800	20.4	0.274	0.154	8.33	7.40	6.49
850	20.1	0.265	0.158	8.43	7.47	6.99
900	19.9	0.255	0.162	8.52	7.53	7.50
950	19.6	0.243	0.167	8.61	7.59	8.01
1000	19.2	0.231	0.173	8.69	7.64	8.53
1050	18.8	0.218	0.180	8.77	7.70	9.05
1100	18.4	0.203	0.190	8.84	7.75	9.58
1150	18.0	0.187	0.201	8.91	7.81	10.12
1200	17.5	0.170	0.215	8.97	7.86	10.65**
1250	17.0	0.152	0.235	----	7.81	11.06**
1300	16.4	0.129	0.266	----	7.45	10.99**
1320	----	----	0.308	----	----	----
1350	15.5	0.155	0.209	----	6.85	10.52**
1400	15.2	0.178	0.178	----	6.28	10.02**
1450	15.2	0.195	0.163	----	6.32	10.46
1500	15.2	0.208	0.153	----	6.38	10.96
1550	15.2	0.219	0.146	----	6.46	11.47
1600	15.3	0.228	0.141	----	----	----

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

8 Ni STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	17.6	0.328	0.109	5.50	----	0.00
100	17.8	0.326	0.111	5.70	5.63	0.20
150	18.1	0.322	0.115	6.00	5.80	0.56
200	18.5	0.319	0.118	6.25	5.94	0.93
250	18.8	0.314	0.122	6.45	6.06	1.31
300	19.0	0.310	0.125	6.60	6.17	1.70
350	19.2	0.306	0.128	6.75	6.28	2.11
400	19.4	0.302	0.131	6.90	6.39	2.53
450	19.5	0.297	0.134	7.04	6.47	2.95
500	19.6	0.292	0.137	7.16	6.56	3.38
550	19.6	0.286	0.140	7.27	6.63	3.82
600	19.7	0.280	0.143	7.37	6.70	4.26
650	19.6	0.273	0.147	7.45	6.72	4.68
700	19.6	0.267	0.150	7.52	6.78	5.13
750	19.6	0.259	0.154	7.57	6.84	5.58
800	19.5	0.251	0.158	7.64	6.89	6.04
850	19.3	0.242	0.163	7.67	6.93	6.49
900	19.2	0.232	0.168	7.71	6.97	6.94
950	18.9	0.220	0.175	7.75	7.00	7.39
1000	18.5	0.206	0.183	7.78	7.03	7.84
1050	18.1	0.192	0.193	7.81	7.05	8.29**
1100	17.7	0.176	0.205	----	6.92	8.55**
1150	17.2	0.158	0.222	----	6.58	8.53**
1200	16.8	0.140	0.245	----	6.13	8.31**
1250	16.3	0.108	0.307*	----	5.54	7.84**
1300	15.9	0.169	0.191	---	5.52	8.15**
1350	15.5	0.186	0.170	---	5.62	8.63
1400	15.3	0.198	0.157	----	5.73	9.14
1450	15.2	0.208	0.149	----	5.83	9.65
1500	15.4	0.218	0.144	----	5.93	10.18

* Extrapolated value.
**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

9 Ni STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	17.4	0.326	0.109	5.50	----	0.00
100	17.8	0.325	0.111	5.70	5.63	0.21
150	18.3	0.325	0.115	6.00	5.80	0.56
200	18.8	0.324	0.118	6.25	5.94	0.93
250	19.1	0.322	0.122	6.45	6.06	1.31
300	19.4	0.319	0.125	6.60	6.17	1.71
350	19.6	0.315	0.128	6.75	6.28	2.11
400	19.7	0.309	0.131	6.90	6.39	2.52
450	19.8	0.303	0.134	7.04	6.47	2.94
500	19.8	0.297	0.137	7.16	6.56	3.37
550	19.8	0.291	0.140	7.27	6.63	3.80
600	19.8	0.284	0.143	7.37	6.70	4.24
650	19.8	0.277	0.147	7.45	6.72	4.68
700	19.7	0.270	0.150	7.52	6.78	5.13
750	19.6	0.263	0.154	7.57	6.84	5.58
800	19.5	0.255	0.158	7.64	6.89	6.03
850	19.4	0.247	0.163	7.67	6.93	6.49
900	19.2	0.237	0.168	7.71	6.97	6.94
950	18.9	0.225	0.175	7.75	7.00	7.39
1000	18.6	0.212	0.183	7.78	7.03	7.84
1050	18.3	0.197	0.193	7.81	7.05	8.29**
1100	17.9	0.181	0.205	----	6.92	8.56**
1150	17.4	0.164	0.222	----	6.58	8.53**
1200	17.0	0.144	0.245	----	6.13	8.32**
1250	16.4	0.111	0.307	----	5.54	7.85**
1300	15.6	0.170	0.191	----	5.52	8.15**
1350	15.1	0.185	0.170	----	5.62	8.63
1400	15.0	0.199	0.157	----	5.73	9.14
1450	15.1	0.211	0.149	----	5.83	9.66
1500	15.2	0.221	0.144	----	5.93	10.18
1550	15.2	0.228	0.140	----	6.00	10.66
1600	15.3	0.233	0.138	----	----	----

**These values are for measurements with increasing temperature and may possibly be lower for measurements with decreasing temperature.

1 1/2 Si - 1/2 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	17.5	0.340	0.106	4.86	----	0.00
100	17.8	0.337	0.108	5.26	4.31	0.16
150	18.1	0.332	0.112	5.80	4.77	0.47
200	18.3	0.327	0.116	6.24	5.22	0.82
250	18.6	0.322	0.119	6.61	5.60	1.21
300	18.7	0.317	0.122	6.93	5.92	1.66
350	18.9	0.312	0.125	7.27	6.18	2.08
400	19.0	0.307	0.128	7.55	6.38	2.54
450	19.0	0.302	0.131	7.80	6.56	3.01
500	19.1	0.297	0.133	8.03	6.71	3.47
550	19.1	0.291	0.136	8.23	6.85	3.95
600	19.0	0.286	0.138	8.40	6.93	4.44
650	19.0	0.280	0.141	8.55	7.10	4.93
700	18.9	0.272	0.145	8.68	7.20	5.44
750	18.7	0.263	0.149	8.78	7.32	5.99
800	18.6	0.255	0.152	8.85	7.42	6.52
850	18.4	0.248	0.156	8.90	7.52	7.05
900	18.3	0.240	0.160	8.93	7.61	7.58
950	18.1	0.232	0.164	8.95	7.70	8.12
1000	17.9	0.224	0.169	8.97	7.77	8.68
1050	17.7	0.215	0.174	----	7.85	9.23
1100	17.5	0.205	0.180	----	7.91	9.77
1150	17.2	0.194	0.188	----	7.96	10.32
1200	17.0	0.183	0.195	----	8.01	10.86
1250	16.5	0.170	0.205	----	8.05	11.40 (10.63)**
1300	15.9	0.156	0.216	----	8.04	11.90 (9.82)
1350	14.9	0.134	0.236	----	8.03	12.38 (9.70)
1400	14.7	0.074	0.420*	----	6.75	10.80 (10.32)
1450	14.5	0.127	0.244	----	6.60	10.94
1500	14.5	0.167	0.184	----	6.75	11.62
1550	14.6	0.185	0.168	----	6.92	12.31
1600	14.7	0.188	0.167	----	7.08	13.02
1650	----	----	----	----	7.26	13.76

* Extrapolated values.
**Values in parentheses are for cooling measurements.

12 Cr (403SS) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	15.8	0.293	0.108	5.92	----	0.00
100	15.9	0.289	0.109	6.03	5.98	0.22
150	16.0	0.284	0.112	6.18	6.08	0.58
200	16.1	0.278	0.114	6.30	6.15	0.96
250	16.2	0.272	0.117	6.41	6.23	1.35
300	16.2	0.267	0.119	6.50	6.30	1.74
350	16.3	0.262	0.122	6.59	6.35	2.13
400	16.3	0.257	0.125	6.66	6.40	2.53
450	16.3	0.253	0.128	6.72	6.44	2.94
500	16.4	0.248	0.131	6.77	6.48	3.34
550	16.4	0.244	0.134	6.83	6.51	3.75
600	16.4	0.239	0.137	6.88	6.53	4.15
650	16.4	0.235	0.140	6.94	6.57	4.57
700	16.4	0.230	0.144	6.99	6.60	4.99
750	16.4	0.225	0.148	7.05	6.64	5.42
800	16.3	0.220	0.152	7.11	6.67	5.84
850	16.3	0.215	0.156	7.16	6.70	6.27
900	16.2	0.210	0.161	7.20	6.72	6.70
950	16.2	0.204	0.166	7.25	6.75	7.13
1000	16.1	0.198	0.171	7.29	6.78	7.56
1050	16.0	0.191	0.177	7.32	6.81	8.00
1100	15.9	0.183	0.184	7.35	6.83	8.44
1150	15.8	0.175	0.193	7.38	6.86	8.86
1200	15.6	0.166	0.205	7.42	6.88	9.33
1250	15.5	0.155	0.222	7.46	6.90	9.78
1300	15.4	0.141	0.245	7.50	6.93	10.22
1340	----	0.126	0.289*	----	----	----
1350	15.3	0.130	----	7.53	6.95	10.67
1375	----	----	0.211	----	----	----
1400	15.3	0.147	0.195	7.56	6.97	11.13
1425	----	----	0.181	----	----	----
1450	15.3	0.163	0.179	7.60	6.99	11.58
1475	----	----	0.178	----	----	----
1500	15.4	0.176	0.179	7.63	7.02	12.04

* Extrapolated value.

12 Cr - 1 Al (405SS) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	14.2	0.274	0.108	5.92	----	0.00
100	14.2	0.271	0.109	6.03	5.98	0.22
150	14.3	0.266	0.112	6.18	6.08	0.58
200	14.3	0.261	0.114	6.30	6.15	0.96
250	14.4	0.256	0.117	6.41	6.23	1.35
300	14.4	0.251	0.119	6.50	6.30	1.74
350	14.4	0.246	0.122	6.59	6.35	2.13
400	14.5	0.241	0.125	6.66	6.40	2.53
450	14.5	0.236	0.128	6.72	6.44	2.94
500	14.5	0.231	0.131	6.77	6.48	3.34
550	14.6	0.226	0.134	6.83	6.51	3.75
600	14.6	0.221	0.137	6.88	6.53	4.15
650	14.6	0.216	0.140	6.94	6.57	4.57
700	14.6	0.211	0.144	6.99	6.60	4.99
750	14.6	0.206	0.148	7.05	6.64	5.42
800	14.7	0.201	0.152	7.11	6.67	5.84
850	14.7	0.196	0.156	7.16	6.70	6.27
900	14.7	0.191	0.161	7.20	6.72	6.70
950	14.7	0.185	0.166	7.25	6.75	7.13
1000	14.7	0.179	0.171	7.29	6.78	7.56
1050	14.7	0.173	0.177	7.32	6.81	8.00
1100	14.7	0.167	0.184	7.35	6.83	8.44
1150	14.8	0.159	0.193	7.38	6.86	8.86
1200	14.8	0.150	0.205	7.42	6.88	9.33
1250	14.8	0.138	0.222	7.46	6.90	9.78
1300	14.8	0.125	0.245	7.50	6.93	10.22
1350	14.8	0.106	0.289*	7.53	6.95	10.67
1375	----	----	0.211	----	----	----
1400	14.8	0.158	0.195	7.56	6.97	11.13
1425	----	----	0.181	----	----	----
1450	14.8	0.172	0.179	7.60	6.99	11.58
1475	----	----	0.178	----	----	----
1500	14.9	0.173	0.179	7.63	7.02	12.04

* Extrapolated value.

13 Cr (410SS) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	15.2	0.287	0.108	5.92	----	0.00
100	15.3	0.283	0.109	6.03	5.98	0.22
150	15.4	0.277	0.112	6.18	6.08	0.58
200	15.5	0.272	0.114	6.30	6.15	0.96
250	15.6	0.267	0.117	6.41	6.23	1.35
300	15.6	0.262	0.119	6.50	6.30	1.74
350	15.7	0.257	0.122	6.59	6.35	2.13
400	15.8	0.253	0.125	6.66	6.40	2.53
450	15.8	0.249	0.128	6.72	6.44	2.94
500	15.8	0.245	0.131	6.77	6.48	3.34
550	15.8	0.241	0.134	6.83	6.51	3.75
600	15.9	0.237	0.137	6.88	6.53	4.15
650	15.9	0.233	0.140	6.94	6.57	4.57
700	15.9	0.228	0.144	6.99	6.60	4.99
750	15.9	0.223	0.148	7.05	6.64	5.42
800	15.9	0.218	0.152	7.11	6.67	5.84
850	15.9	0.213	0.156	7.16	6.70	6.27
900	15.9	0.207	0.161	7.20	6.72	6.70
950	15.8	0.201	0.166	7.25	6.75	7.13
1000	15.8	0.194	0.171	7.29	6.78	7.56
1050	15.7	0.187	0.177	7.32	6.81	8.00
1100	15.6	0.179	0.184	7.35	6.83	8.44
1150	15.4	0.171	0.193	7.38	6.86	8.86
1200	15.3	0.160	0.205	7.42	6.88	9.33
1250	15.2	0.148	0.222	7.46	6.90	9.78
1300	15.1	0.133	0.250	7.50	6.93	10.22
1320	----	0.125	0.289*	----	----	----
1350	15.0	0.134	----	7.53	6.95	10.67
1375	----	----	0.201	----	----	----
1400	15.0	0.150	0.180	7.56	6.97	11.13
1425	----	----	0.181	----	----	----
1450	15.0	0.165	0.179	7.60	6.99	11.58
1475	----	----	0.178	----	----	----
1500	15.1	0.178	0.179	7.63	7.02	12.04

* Extrapolated value.

13 Cr - 4 Ni (CA6NM) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	14.3	0.279	0.108	5.92	----	0.00
100	14.4	0.277	0.109	6.03	5.98	0.22
150	14.5	0.273	0.112	6.18	6.08	0.58
200	14.6	0.269	0.114	6.30	6.15	0.96
250	14.7	0.264	0.117	6.41	6.23	1.35
300	14.8	0.260	0.119	6.50	6.30	1.74
350	14.8	0.255	0.122	6.59	6.35	2.13
400	14.9	0.250	0.125	6.66	6.40	2.53
450	15.0	0.245	0.128	6.72	6.44	2.94
500	15.0	0.240	0.131	6.77	6.48	3.34
550	15.0	0.236	0.134	6.83	6.51	3.75
600	15.1	0.231	0.137	6.88	6.53	4.15
650	15.1	0.226	0.140	6.94	6.57	4.57
700	15.1	0.220	0.144	6.99	6.60	4.99
750	15.1	0.214	0.148	7.05	6.64	5.42
800	15.1	0.209	0.152	7.11	6.67	5.84
850	15.1	0.203	0.156	7.16	6.70	6.27
900	15.1	0.197	0.161	7.20	6.72	6.70
950	15.1	0.191	0.166	7.25	6.75	7.13
1000	15.1	0.185	0.171	7.29	6.78	7.56
1050	15.0	0.178	0.177	7.32	6.81	8.00
1100	15.0	0.171	0.184	7.35	6.83	8.44
1150	15.0	0.160	0.197	7.38	6.86	8.86
1200	14.9	0.145	0.216	7.42	6.88	9.33
1250	14.9	0.126	0.247	7.46	6.90	9.78
1270	----	0.116	0.268*	----	----	----
1300	14.8	0.129	0.242	7.50	6.93	10.22
1350	14.8	0.148	0.210	7.53	6.95	10.67
1400	14.8	0.164	0.190	7.56	6.97	11.13
1450	14.9	0.175	0.179	7.60	6.99	11.58
1500	15.0	0.176	0.179	7.63	7.02	12.04

* trapolated value.

15 Cr (429SS) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	14.2	0.275	0.109	5.33	----	0.00
100	14.2	0.272	0.110	5.41	5.37	0.19
150	14.3	0.268	0.113	5.54	5.45	0.52
200	14.4	0.263	0.116	5.66	5.52	0.86
250	14.5	0.259	0.118	5.77	5.59	1.21
300	14.5	0.254	0.121	5.88	5.65	1.56
350	14.6	0.250	0.123	5.99	5.70	1.92
400	14.6	0.246	0.126	6.09	5.75	2.28
450	14.7	0.242	0.129	6.19	5.80	2.65
500	14.7	0.238	0.132	6.28	5.85	3.02
550	14.7	0.234	0.136	6.37	5.90	3.40
600	14.7	0.230	0.139	6.46	5.95	3.78
650	14.7	0.226	0.142	6.54	6.00	4.18
700	14.8	0.222	0.146	6.62	6.05	4.57
750	14.8	0.217	0.150	6.70	6.09	4.97
800	14.8	0.212	0.154	6.77	6.13	5.31
850	14.8	0.207	0.159	6.84	6.18	5.78
900	14.8	0.201	0.164	6.91	6.22	6.19
950	14.8	0.195	0.170	6.96	6.26	6.61
1000	14.8	0.188	0.179	7.02	6.30	7.03
1050	14.8	0.180	0.187	7.07	6.34	7.45
1100	14.8	0.172	0.200	7.12	6.37	7.88
1150	14.8	0.163	0.214	7.16	6.41	8.31
1200	14.8	0.151	0.230	7.21	6.44	8.74
1250	14.8	0.136	0.249	7.24	6.48	9.17
1290	----	0.114	0.268*	----	----	----
1300	14.8	0.128	0.244	7.27	6.51	9.61
1350	14.8	0.146	0.207	7.30	6.54	10.04
1400	14.8	0.160	0.189	7.33	6.57	10.48
1450	14.8	0.171	0.180	7.34	6.60	10.92
1500	14.8	0.180	0.176	7.36	6.62	11.36

* Extrapolated value.

16 Cr - 12 Ni - 2 Mo and 16 Cr - 12 Ni - 2 Mo - N
(AISI 316, CAST 316, 316L, 316H, and 316N) STAINLESS STEELS

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	7.7	0.134	0.111	8.42	-----	0.00
100	7.9	0.136	0.113	8.59	8.54	0.30
150	8.2	0.138	0.115	8.84	8.64	0.78
200	8.4	0.141	0.118	9.09	8.76	1.32
250	8.7	0.143	0.120	9.33	8.88	1.92
300	9.0	0.145	0.122	9.56	8.97	2.50
350	9.2	0.148	0.123	9.76	9.11	3.08
400	9.5	0.151	0.125	9.95	9.21	3.64
450	9.8	0.153	0.127	10.10	9.32	4.25
500	10.0	0.156	0.128	10.25	9.42	4.86
550	10.3	0.159	0.129	10.38	9.50	5.47
600	10.5	0.162	0.131	10.51	9.60	6.11
650	10.7	0.164	0.132	10.64	9.69	6.72
700	11.0	0.167	0.133	10.76	9.76	7.39
750	11.2	0.170	0.134	10.87	9.81	8.02
800	11.5	0.173	0.135	10.98	9.90	8.66
850	11.7	0.176	0.135	11.09	9.95	9.29
900	12.0	0.178	0.136	11.20	10.02	9.97
950	12.2	0.181	0.137	11.31	10.09	10.66
1000	12.4	0.184	0.138	11.40	10.16	11.35
1050	12.7	0.186	0.139	11.49	10.22	12.04
1100	12.9	0.189	0.140	11.58	10.29	12.72
1150	13.1	0.191	0.140	11.65	10.35	13.40
1200	13.3	0.194	0.141	11.72	10.40	14.11
1250	13.6	0.196	0.142	11.78	10.47	14.81
1300	13.8	0.199	0.143	11.82	10.52	15.53
1350	14.0	0.201	0.144	11.86	10.58	16.25
1400	14.2	0.203	0.145	11.90	10.62	16.96
1450	14.4	0.206	0.146	11.94	10.67	17.69
1500	14.6	0.208	0.147	11.97	10.71	18.40
1550	14.8	0.210	0.149	12.00	10.74	19.09
1600	15.0	0.212	0.150	12.03	10.78	19.79

17 Cr (430SS) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	12.6	0.261	0.109	5.33	----	0.00
100	12.7	0.258	0.110	5.41	5.37	0.19
150	12.8	0.254	0.113	5.54	5.45	0.52
200	12.8	0.251	0.116	5.66	5.52	0.86
250	12.9	0.247	0.118	5.77	5.59	1.21
300	13.0	0.243	0.121	5.88	5.65	1.60
350	13.0	0.240	0.123	5.99	5.70	1.92
400	13.1	0.237	0.126	6.09	5.75	2.28
450	13.1	0.233	0.129	6.19	5.80	2.65
500	13.2	0.229	0.132	6.28	5.85	3.02
550	13.2	0.226	0.135	6.37	5.90	3.40
600	13.3	0.222	0.138	6.46	5.95	3.78
650	13.3	0.218	0.142	6.54	6.00	4.18
700	13.4	0.214	0.146	6.62	6.05	4.57
750	13.4	0.209	0.150	6.70	6.09	4.97
800	13.5	0.203	0.154	6.77	6.13	5.31
850	13.5	0.198	0.159	6.84	6.18	5.78
900	13.6	0.192	0.164	6.91	6.22	6.19
950	13.6	0.186	0.170	6.96	6.26	6.61
1000	13.7	0.179	0.178	7.02	6.30	7.03
1050	13.7	0.171	0.187	7.07	6.34	7.45
1100	13.8	0.163	0.200	7.12	6.37	7.88
1150	13.8	0.153	0.216	7.16	6.41	8.31
1200	13.9	0.139	0.235	7.21	6.44	8.74
1250	14.0	0.120	0.260*	7.24	6.48	9.17
1300	14.1	0.134	0.229	7.27	6.51	9.61
1350	14.2	0.146	0.206	7.30	6.54	10.04
1400	14.3	0.157	0.190	7.33	6.57	10.48
1450	14.4	0.166	0.180	7.34	6.60	10.92
1500	14.5	0.174	0.176	7.36	6.62	11.36

* Extrapolated value.

17 Cr - 4 Ni - 4 Cu (17-4PH) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	9.9	0.188	0.109	5.89	----	0.00
100	10.1	0.189	0.110	5.89	5.89	0.21
150	10.4	0.189	0.113	5.89	5.89	0.56
200	10.6	0.189	0.116	5.90	5.90	0.92
250	10.9	0.190	0.118	5.90	5.90	1.27
300	11.2	0.190	0.121	5.90	5.90	1.63
350	11.4	0.191	0.123	5.91	5.91	1.99
400	11.7	0.191	0.126	5.91	5.91	2.34
450	12.0	0.191	0.129	5.91	5.91	2.70
500	12.2	0.190	0.132	5.91	5.91	3.05
550	12.5	0.190	0.135	5.93	5.93	3.42
600	12.7	0.190	0.138	5.96	5.93	3.77
650	13.0	0.188	0.142	5.99	5.93	4.13
700	13.2	0.186	0.146	6.03	5.94	4.49
750	13.4	0.183	0.150	6.08	5.95	4.86
800	13.5	0.180	0.154	6.14	5.96	5.22
850	13.6	0.176	0.159	6.21	5.97	5.59
900	13.7	0.172	0.164	6.29	5.99	5.97
950	13.8	0.167	0.170	6.37	6.01	6.35
1000	13.8	0.160	0.178	6.47	6.03	6.73
1050	13.9	0.153	0.187	6.57	6.06	7.12
1100	14.0	0.146	0.197	6.68	6.08	7.52
1150	14.1	0.134	0.216	6.80	6.11	7.92
1200	14.2	0.129	0.227	6.93	6.15	8.34
1225	----	0.123	0.240*	----	----	----
1250	14.4	0.140	0.225	7.06	6.18	8.76
1300	14.6	0.152	0.198	7.21	6.22	9.18
1350	14.8	0.171	0.178	7.36	6.26	9.62
1400	15.0	0.185	0.167	7.52	6.31	10.07
1450	15.2	0.194	0.161	7.69	6.35	10.52
1500	15.4	0.201	0.158	7.87	6.40	10.99

* Extrapolated value.

18 Cr - 5 Ni - 3 Mo STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	8.4	0.158	0.109	7.94	----	0.00
100	8.5	0.159	0.110	8.06	8.03	0.29
150	8.8	0.159	0.113	8.26	8.17	0.78
200	9.0	0.159	0.116	8.43	8.25	1.29
250	9.2	0.159	0.118	8.61	8.35	1.80
300	9.4	0.159	0.121	8.78	8.45	2.33
350	9.6	0.159	0.123	8.94	8.54	2.87
400	9.8	0.159	0.126	9.09	8.61	3.41
450	10.0	0.158	0.129	9.24	8.69	3.96
500	10.2	0.158	0.132	9.38	8.76	4.52
550	10.4	0.157	0.135	9.52	8.83	5.09
600	10.6	0.157	0.138	9.64	8.90	5.66
650	10.8	0.155	0.142	9.76	[illegible]97	6.24
700	11.0	0.154	0.146	9.87	[illegible]4	6.83
750	11.1	0.152	0.150	9.98	[illegible]08	7.43
800	11.3	0.150	0.154	10.08	[illegible]16	8.03
850	11.5	0.148	0.159	10.17	9.22	8.64
900	11.7	0.146	0.164	10.25	9.29	9.25
950	11.9	0.143	0.170	10.33	9.34	9.87
1000	12.1	0.139	0.178	10.40	9.40	10.49
1050	12.3	0.135	0.187	10.46	[illegible].45	11.11
1100	12.5	0.130	0.197	10.52	9.50	11.74
1150	12.6	0.120	0.216	10.57	9.55	12.38
1200	12.8	0.116	0.227	10.61	9.60	13.01
1225	----	0.111	0.240*	----	----	----
1250	13.0	0.127	0.225	10.65	9.64	13.65
1300	13.2	0.137	0.198	10.68	9.68	14.27
1350	13.4	0.155	0.178	10.70	9.72	14.93
1400	13.7	0.168	0.167	10.71	9.76	15.78
1450	13.9	0.177	0.161	10.72	9.79	16.22
1500	14.1	0.182	0.158	10.72	9.82	16.86

* Extrapolated value.

18 Cr - 8 Ni (AISI 302) STAINLESS STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	8.7	0.151	0.114	7.93	----	0.00
100	8.9	0.152	0.116	8.16	8.03	0.28
150	9.1	0.154	0.118	8.50	8.20	0.78
200	9.4	0.156	0.120	8.83	8.37	1.31
250	9.7	0.158	0.122	9.13	8.54	1.81
300	10.0	0.160	0.124	9.40	8.70	2.44
350	10.2	0.162	0.126	9.63	8.85	2.98
400	10.5	0.165	0.127	9.83	8.97	3.55
450	10.7	0.167	0.129	9.99	9.11	4.14
500	11.0	0.170	0.130	10.14	9.23	4.76
550	11.2	0.172	0.131	10.27	9.33	5.39
600	11.5	0.174	0.133	10.40	9.42	6.00
650	11.7	0.177	0.134	10.51	9.50	6.60
700	11.9	0.179	0.135	10.63	9.57	7.24
750	12.1	0.181	0.136	10.74	9.63	7.85
800	12.4	0.184	0.136	10.84	9.71	8.51
850	12.6	0.186	0.137	10.94	9.79	9.16
900	12.8	0.189	0.138	11.05	9.87	9.82
950	13.0	0.191	0.139	11.15	9.94	10.51
1000	13.3	0.194	0.140	11.25	10.01	11.18
1050	13.5	0.196	0.140	11.33	10.07	11.87
1100	13.7	0.198	0.141	11.42	10.14	12.55
1150	13.9	0.201	0.142	11.50	10.20	13.22
1200	14.1	0.203	0.143	11.58	10.26	13.93
1250	14.3	0.205	0.143	11.63	10.31	14.60
1300	14.5	0.208	0.144	11.67	10.37	15.29
1350	14.7	0.210	0.145	11.71	10.42	15.98
1400	14.9	0.212	0.146	11.74	10.47	16.70
1450	15.1	0.214	0.147	11.77	10.52	17.42
1500	15.3	0.216	0.149	11.80	10.56	18.12
1550	15.5	0.218	0.150	11.82	10.61	18.84
1600	15.7	0.220	0.151	11.83	10.65	19.56

18 Cr - 8 Ni and 18 Cr - 8 Ni - N (AISI 303, 303 Se, 304, 304L, 304H, and 304N) STAINLESS STEELS

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	8.6	0.151	0.114		-----	0.00
100	8.7	0.152	0.116		8.03	0.28
150	9.0	0.154	0.118		8.20	0.78
200	9.3	0.156	0.120		8.37	1.31
250	9.6	0.158	0.122		8.54	1.81
300	9.8	0.160	0.124		8.70	2.44
350	10.1	0.162	0.126	9.63	8.85	2.98
400	10.4	0.165	0.127	9.83	8.97	3.55
450	10.6	0.167	0.129	9.99	9.11	4.14
500	10.9	0.170	0.130	10.14	9.23	4.76
550	11.1	0.172	0.131	10.27	9.33	5.39
600	11.3	0.174	0.133	10.40	9.42	6.00
650	11.6	0.177	0.134	10.51	9.50	6.60
700	11.8	0.179	0.135	10.63	9.57	7.24
750	12.0	0.181	0.136	10.74	9.63	7.85
800	12.2	0.184	0.136	10.84	9.71	8.51
850	12.5	0.186	0.137	10.94	9.79	9.16
900	12.7	0.189	0.138	11.05	9.87	9.82
950	12.9	0.191	0.139	11.15	9.94	10.51
1000	13.2	0.194	0.140	11.25	10.01	11.18
1050	13.4	0.196	0.140	11.33	10.07	11.87
1100	13.6	0.198	0.141	11.42	10.14	12.55
1150	13.8	0.201	0.142	11.50	10.20	13.22
1200	14.0	0.203	0.143	11.58	10.26	13.93
1250	14.3	0.205	0.143	11.63	10.31	14.60
1300	14.5	0.208	0.144	11.67	10.37	15.29
1350	14.7	0.210	0.145	11.71	10.42	15.98
1400	14.9	0.212	0.146	11.74	10.47	16.70
1450	15.1	0.214	0.147	11.77	10.52	17.42
1500	15.3	0.216	0.149	11.80	10.56	18.12
1550	15.5	0.218	0.150	11.82	10.61	18.84
1600	15.7	0.220	0.151	11.83	10.65	19.56

18 Cr - 10 Ni-Cb (AISI 347, CAST 347, 347H, 348 and 348H) STAINLESS STEELS

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	8.1	0.143	0.114	8.53	----	0.00
100	8.4	0.145	0.116	8.70	8.62	0.31
150	8.6	0.147	0.118	9.00	8.75	0.86
200	8.8	0.149	0.120	9.29	8.92	1.39
250	9.1	0.151	0.122	9.55	9.07	1.97
300	9.4	0.153	0.124	9.78	9.22	2.54
350	9.6	0.156	0.126	9.98	9.32	3.16
400	9.9	0.158	0.127	10.16	9.45	3.72
450	10.1	0.160	0.129	10.30	9.55	4.34
500	10.4	0.163	0.130	10.44	9.65	4.98
550	10.6	0.166	0.131	10.55	9.75	5.62
600	10.9	0.168	0.133	10.66	9.83	6.26
650	11.2	0.170	0.134	10.76	9.90	6.89
700	11.4	0.173	0.135	10.86	9.97	7.55
750	11.6	0.175	0.136	10.96	10.03	8.18
800	11.9	0.178	0.136	11.05	10.08	8.83
850	12.1	0.180	0.137	11.14	10.14	9.49
900	12.3	0.183	0.138	11.23	10.22	10.15
950	12.6	0.186	0.139	11.31	10.26	10.84
1000	12.8	0.188	0.140	11.40	10.33	11.54
1050	13.1	0.190	0.140	11.47	10.40	12.23
1100	13.3	0.193	0.141	11.55	10.45	12.91
1150	13.5	0.195	0.142	11.63	10.47	13.57
1200	13.7	0.198	0.143	11.71	10.56	14.32
1250	13.9	0.200	0.143	11.78	10.60	15.01
1300	14.1	0.202	0.144	11.85	10.66	15.73
1350	14.4	0.205	0.145	11.92	10.70	16.44
1400	14.6	0.207	0.146	11.98	10.75	17.17
1450	14.8	0.209	0.147	12.05	10.80	17.89
1500	15.0	0.212	0.149	12.11	10.83	18.58
1550	15.2	0.214	0.150	12.18	10.87	19.31
1600	15.4	0.216	0.151	12.23	10.90	20.02

18 Cr - 10 Ni-Ti (AISI 321 and 321H) STAINLESS STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	8.1	0.143	0.111	8.97	----	0.00
100	8.4	0.145	0.113	9.03	9.05	0.33
150	8.6	0.147	0.115	9.13	9.13	0.88
200	8.8	0.149	0.118	9.23	9.18	1.43
250	9.1	0.151	0.120	9.33	9.23	1.99
300	9.4	0.153	0.122	9.41	9.26	2.56
350	9.6	0.156	0.123	9.49	9.30	3.12
400	9.9	0.158	0.125	9.57	9.34	3.70
450	10.1	0.160	0.127	9.64	9.38	4.27
500	10.4	0.163	0.128	9.72	9.42	4.86
550	10.6	0.166	0.129	9.78	9.45	5.45
600	10.9	0.168	0.131	9.85	9.48	6.02
650	11.1	0.170	0.132	9.92	9.52	6.62
700	11.4	0.173	0.133	9.98	9.55	7.22
750	11.6	0.175	0.134	10.04	9.58	7.81
800	11.9	0.178	0.135	10.10	9.61	8.42
850	12.1	0.180	0.135	10.14	9.64	9.02
900	12.3	0.183	0.136	10.18	9.67	9.64
950	12.6	0.186	0.137	10.23	9.70	10.25
1000	12.8	0.188	0.138	10.28	9.73	10.86
1050	13.1	0.190	0.139	10.33	9.76	11.48
1100	13.3	0.193	0.140	10.37	9.79	12.10
1150	13.5	0.195	0.140	10.40	9.82	12.73
1200	13.7	0.198	0.141	10.44	9.85	13.36
1250	13.9	0.200	0.142	10.48	9.88	13.98
1300	14.1	0.202	0.143	10.51	9.90	14.62
1350	14.4	0.205	0.144	10.54	9.93	15.24
1400	14.6	0.207	0.145	10.57	9.95	15.88
1450	14.8	0.209	0.146	10.61	9.98	16.52
1500	15.0	0.212	0.147	10.63	10.00	17.16
1550	15.2	0.214	0.149	10.67	10.02	17.80
1600	15.4	0.216	0.150	10.69	10.04	18.43

18 Cr - 11 Ni (305SS) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	8.6	0.150	0.114	7.93	----	0.00
100	8.7	0.151	0.116	8.16	8.03	0.29
150	9.0	0.153	0.118	8.50	8.20	0.79
200	9.3	0.155	0.120	8.83	8.37	1.31
250	9.6	0.157	0.122	9.13	8.54	1.84
300	9.8	0.159	0.124	9.40	8.70	2.42
350	10.1	0.161	0.126	9.63	8.85	2.97
400	10.4	0.164	0.127	9.83	8.97	3.58
450	10.6	0.166	0.129	9.99	9.11	4.18
500	10.9	0.168	0.130	10.14	9.23	4.78
550	11.1	0.171	0.131	10.27	9.33	5.39
600	11.3	0.173	0.133	10.40	9.42	6.01
650	11.6	0.175	0.134	10.51	9.50	6.64
700	11.8	0.178	0.135	10.63	9.57	7.27
750	12.0	0.181	0.136	10.74	9.63	7.92
800	12.3	0.183	0.136	10.84	9.71	8.56
850	12.5	0.185	0.137	10.94	9.79	9.22
900	12.7	0.188	0.138	11.05	9.87	9.88
950	13.0	0.190	0.139	11.15	9.94	10.54
1000	13.2	0.192	0.140	11.25	10.01	11.21
1050	13.4	0.195	0.140	11.33	10.07	11.89
1100	13.6	0.197	0.141	11.42	10.14	12.58
1150	13.8	0.199	0.142	11.50	10.20	13.26
1200	14.1	0.201	0.143	11.58	10.26	13.96
1250	14.3	0.204	0.143	11.63	10.31	14.65
1300	14.5	0.206	0.144	11.67	10.37	15.35
1350	14.7	0.208	0.145	11.71	10.42	16.04
1400	14.9	0.210	0.146	11.74	10.47	16.75
1450	15.1	0.212	0.147	11.77	10.52	17.46
1500	15.3	0.214	0.149	11.80	10.56	18.17
1550	----	----	0.150	----	----	----
1600	----	----	0.151	----	----	----

18 Cr - 13 Ni - 3 Mo (AISI 317 AND 317L) STAINLESS STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	7.4	0.134	0.111	8.42	----	0.00
100	7.6	0.136	0.113	8.59	8.54	0.30
150	7.9	0.138	0.115	8.84	8.64	0.78
200	8.1	0.141	0.118	9.09	8.76	1.32
250	8.4	0.143	0.120	9.33	8.88	1.92
300	8.7	0.145	0.122	9.56	8.97	2.50
350	9.0	0.148	0.123	9.76	9.11	3.08
400	9.2	0.151	0.125	9.95	9.21	3.64
450	9.5	0.153	0.127	10.10	9.32	4.25
500	9.7	0.156	0.128	10.25	9.42	4.86
550	10.0	0.159	0.129	10.38	9.50	5.47
600	10.3	0.162	0.131	10.51	9.60	6.11
650	10.5	0.164	0.132	10.64	9.69	6.72
700	10.7	0.167	0.133	10.76	9.76	7.39
750	11.0	0.170	0.134	10.87	9.81	8.02
800	11.2	0.173	0.135	10.98	9.90	8.66
850	11.5	0.176	0.135	11.09	9.95	9.29
900	11.7	0.178	0.136	11.20	10.02	9.97
950	12.0	0.181	0.137	11.31	10.09	10.66
1000	12.2	0.184	0.138	11.40	10.16	11.35
1050	12.5	0.186	0.139	11.49	10.22	12.04
1100	12.7	0.189	0.140	11.58	10.29	12.72
1150	12.9	0.191	0.140	11.65	10.35	13.40
1200	13.2	0.194	0.141	11.72	10.40	14.11
1250	13.4	0.196	0.142	11.78	10.47	14.81
1300	13.6	0.199	0.143	11.82	10.52	15.53
1350	13.8	0.201	0.144	11.86	10.58	16.25
1400	14.1	0.203	0.145	11.90	10.62	16.96
1450	14.3	0.206	0.146	11.94	10.67	17.69
1500	14.5	0.208	0.147	11.97	10.	18.40
1550	14.7	0.210	0.149	12.00	10.74	19.09
1600	14.9	0.212	0.150	12.03	10.78	19.79

18 Cr - 18 Ni - 2 Si (XM15) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	6.4	0.115	0.114	8.87	----	0.00
100	6.6	0.116	0.116	8.96	8.91	0.32
150	6.9	0.119	0.118	9.08	9.00	0.86
200	7.2	0.122	0.120	9.21	9.07	1.42
250	7.5	0.125	0.122	9.33	9.15	1.98
300	7.8	0.127	0.124	9.44	9.20	2.54
350	8.0	0.130	0.126	9.56	9.28	3.12
400	8.3	0.133	0.127	9.67	9.33	3.70
450	8.6	0.136	0.129	9.78	9.39	4.28
500	8.9	0.139	0.130	9.88	9.44	4.87
550	9.2	0.142	0.131	9.99	9.49	5.47
600	9.4	0.144	0.133	10.09	9.54	6.07
650	9.7	0.147	0.134	10.18	9.59	6.68
700	10.0	0.150	0.135	10.28	9.64	7.29
750	10.2	0.153	0.136	10.37	9.69	7.91
800	10.5	0.157	0.136	10.46	9.74	8.53
850	10.8	0.160	0.137	10.54	9.79	9.16
900	11.1	0.162	0.138	10.62	9.84	9.80
950	11.3	0.165	0.139	10.70	9.89	10.44
1000	11.6	0.168	0.140	10.77	9.93	11.08
1050	11.8	0.171	0.140	10.84	9.98	11.73
1100	12.1	0.174	0.141	10.92	10.02	12.38
1150	12.4	0.177	0.142	10.98	10.06	13.04
1200	12.6	0.179	0.143	11.04	10.11	13.70
1250	12.9	0.182	0.143	11.11	10.14	14.24
1300	13.1	0.185	0.144	11.16	10.19	15.03
1350	13.4	0.187	0.145	11.22	10.23	15.71
1400	13.7	0.190	0.146	11.27	10.26	16.38
1450	13.9	0.192	0.147	11.31	10.30	17.06
1500	14.2	0.193	0.149	11.36	10.34	17.74
1550	----	-----	0.150	-----	-----	-----
1600	----	-----	0.151	-----	-----	-----

19 Cr - 9 Ni - Mo - W (19-9DL) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-3} in ft^{-1})
70	7.5	0.137	0.111	9.10	----	0.00
100	7.7	0.139	0.113	9.21	9.17	0.33
150	8.0	0.141	0.115	9.38	9.27	0.89
200	8.3	0.142	0.118	9.54	9.37	1.46
250	8.6	0.145	0.120	9.70	9.46	2.04
300	8.9	0.148	0.122	9.85	9.54	2.63
350	9.2	0.151	0.123	9.99	9.63	3.24
400	9.5	0.154	0.125	10.13	9.69	3.84
450	9.8	0.156	0.127	10.26	9.76	4.45
500	10.1	0.159	0.128	10.38	9.83	5.07
550	10.3	0.161	0.129	10.50	9.89	5.69
600	10.6	0.163	0.131	10.61	9.95	6.33
650	10.8	0.165	0.132	10.72	10.01	6.97
700	11.0	0.167	0.133	10.81	10.07	7.62
750	11.2	0.169	0.134	10.91	10.13	8.27
800	11.4	0.171	0.135	10.99	10.18	8.92
850	11.6	0.173	0.135	11.07	10.24	9.58
900	11.7	0.174	0.136	11.14	10.29	10.25
950	11.9	0.175	0.137	11.21	10.34	10.92
1000	12.0	0.176	0.138	11.26	10.39	11.59
1050	12.1	0.176	0.139	11.32	10.44	12.27
1100	12.2	0.177	0.140	11.36	10.48	12.95
1150	12.3	0.178	0.140	11.40	10.52	13.64
1200	12.5	0.179	0.141	11.43	10.56	14.32
1250	12.7	0.180	0.142	11.46	10.60	15.01
1300	12.9	0.182	0.143	11.48	10.63	15.70
1350	13.1	0.184	0.144	11.50	10.67	16.39
1400	13.4	0.186	0.145	11.51	10.70	17.08
1450	13.6	0.189	0.146	11.51	10.73	17.77
1500	13.9	0.191	0.147	11.51	10.76	18.46
1550	----	0.192	0.149	-----	-----	-----
1600	----	0.195	0.150	-----	-----	-----

22 Cr - 13 Ni - 5 Mn (XM19) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	6.4	0.115	0.114	8.24	----	0.00
100	6.6	0.116	0.116	8.35	8.30	0.30
150	6.9	0.118	0.118	8.51	8.40	0.81
200	7.1	0.121	0.120	8.67	8.48	1.32
250	7.4	0.124	0.122	8.81	8.57	1.85
300	7.7	0.126	0.124	8.95	8.65	2.39
350	8.0	0.129	0.125	9.08	8.73	2.93
400	8.2	0.132	0.127	9.21	8.79	3.48
450	8.5	0.135	0.129	9.33	8.86	4.04
500	8.8	0.138	0.130	9.44	8.92	4.60
550	9.1	0.141	0.131	9.54	8.98	5.17
600	9.3	0.143	0.133	9.64	9.03	5.75
650	9.6	0.146	0.134	9.73	9.09	6.33
700	9.9	0.149	0.135	9.82	9.15	6.91
750	10.1	0.152	0.136	9.89	9.20	7.51
800	10.4	0.155	0.136	9.97	9.25	8.10
850	10.6	0.158	0.137	10.03	9.29	8.70
900	10.9	0.161	0.138	10.08	9.34	9.30
950	11.2	0.164	0.139	10.13	9.39	9.91
1000	11.4	0.167	0.140	10.18	9.43	10.52
1050	11.7	0.170	0.140	10.21	9.47	11.13
1100	12.0	0.173	0.141	10.24	9.50	11.75
1150	12.2	0.175	0.142	10.26	9.54	12.36
1200	12.5	0.178	0.143	10.27	9.57	12.98
1250	12.7	0.181	0.143	10.28	9.60	13.59
1300	12.9	0.184	0.144	10.29	9.63	14.21
1350	13.2	0.186	0.145	10.29	9.65	14.83
1400	13.5	0.188	0.146	10.30	9.68	15.44
1450	13.7	0.190	0.147	10.30	9.70	16.06
1500	14.0	0.191	0.149	10.30	9.72	16.67
1550	----	-----	0.150	-----	-----	-----
1600	----	-----	0.151	-----	-----	-----

23 Cr - 12 Ni (309SS) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	8.2	0.139	0.114	8.72	----	0.00
100	8.3	0.140	0.116	8.83	8.79	0.32
150	8.6	0.142	0.118	8.91	8.87	0.85
200	8.8	0.145	0.120	8.99	8.95	1.40
250	9.1	0.147	0.122	9.06	8.99	1.94
300	9.3	0.150	0.124	9.11	9.04	2.50
350	9.5	0.152	0.126	9.16	9.05	3.04
400	9.8	0.155	0.127	9.19	9.08	3.59
450	10.0	0.157	0.129	9.23	9.09	4.15
500	10.2	0.160	0.130	9.28	9.11	4.70
550	10.5	0.162	0.131	9.33	9.13	5.26
600	10.7	0.165	0.133	9.36	9.15	5.82
650	10.9	0.167	0.134	9.41	9.17	6.38
700	11.2	0.170	0.135	9.44	9.19	6.95
750	11.4	0.172	0.136	9.49	9.21	7.52
800	11.6	0.175	0.136	9.53	9.23	8.09
850	11.9	0.177	0.137	9.57	9.25	8.66
900	12.1	0.179	0.138	9.62	9.27	9.24
950	12.3	0.182	0.139	9.67	9.30	9.82
1000	12.5	0.184	0.140	9.72	9.32	10.40
1050	12.8	0.187	0.140	9.76	9.34	10.98
1100	13.0	0.189	0.141	9.81	9.36	11.57
1150	13.2	0.191	0.142	9.85	9.38	12.16
1200	13.4	0.194	0.143	9.89	9.40	12.75
1250	13.6	0.196	0.143	9.94	9.42	13.34
1300	13.8	0.198	0.144	10.00	9.45	13.94
1350	14.1	0.200	0.145	10.04	9.47	14.54
1400	14.3	0.202	0.146	10.09	9.49	15.15
1450	14.5	0.205	0.147	10.15	9.52	15.76
1500	14.7	0.207	0.149	10.19	9.53	16.37
1550	----	-----	0.150	-----	-----	-----
1600	----	-----	0.151	-----	-----	-----

25 Cr - 12 Ni (CH8/CH20) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	6.4	0.116	0.114	8.81	----	0.00
100	6.6	0.118	0.116	8.89	8.87	0.32
150	6.9	0.121	0.118	8.99	8.95	0.86
200	7.2	0.124	0.120	9.06	9.02	1.41
250	7.5	0.127	0.122	9.11	9.06	1.96
300	7.8	0.130	0.124	9.17	9.10	2.51
350	8.1	0.133	0.126	9.22	9.12	3.06
400	8.4	0.136	0.127	9.27	9.14	3.62
450	8.6	0.139	0.129	9.29	9.16	4.13
500	8.9	0.142	0.130	9.33	9.18	4.74
550	9.2	0.145	0.131	9.37	9.20	5.30
600	9.5	0.148	0.133	9.39	9.21	5.86
650	9.8	0.151	0.134	9.44	9.23	6.42
700	10.0	0.154	0.135	9.47	9.25	6.99
750	10.3	0.157	0.136	9.52	9.27	7.56
800	10.6	0.160	0.136	9.56	9.28	8.13
850	10.8	0.163	0.137	9.61	9.30	8.71
900	11.1	0.166	0.138	9.66	9.32	9.29
950	11.4	0.169	0.139	9.71	9.35	9.87
1000	11.6	0.172	0.140	9.78	9.37	10.45
1050	11.9	0.175	0.140	9.84	9.39	11.04
1100	12.1	0.178	0.141	9.94	9.41	11.64
1150	12.4	0.180	0.142	10.05	9.44	12.24
1200	12.6	0.183	0.143	10.17	9.47	12.84
1250	12.9	0.186	0.143	10.31	9.50	13.45
1300	13.1	0.189	0.144	10.47	9.54	14.08
1350	13.4	0.191	0.145	10.65	9.58	14.71
1400	13.6	0.193	0.146	10.86	9.62	15.36
1450	13.9	0.195	0.147	11.07	9.67	16.01
1500	14.1	0.196	0.149	11.34	9.72	16.69
1550	----	-----	0.150	-----	-----	-----
1600	----	-----	0.151	-----	-----	-----

25 Cr - 20 Ni (310SS) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	7.3	0.130	0.114	8.72	----	0.00
100	7.5	0.131	0.116	8.83	8.79	0.32
150	7.8	0.133	0.118	8.91	8.87	0.85
200	8.0	0.136	0.120	8.99	8.95	1.40
250	8.3	0.138	0.122	9.06	8.99	1.94
300	8.6	0.141	0.123	9.11	9.04	2.50
350	8.8	0.143	0.125	9.16	9.05	3.04
400	9.1	0.146	0.126	9.19	9.08	3.59
450	9.3	0.149	0.127	9.23	9.09	4.15
500	9.6	0.151	0.128	9.28	9.11	4.70
550	9.9	0.154	0.129	9.33	9.13	5.26
600	10.1	0.157	0.130	9.36	9.15	5.82
650	10.4	0.159	0.132	9.41	9.17	6.38
700	10.6	0.162	0.133	9.44	9.19	6.95
750	10.9	0.165	0.133	9.49	9.21	7.52
800	11.1	0.168	0.134	9.53	9.23	8.09
850	11.4	0.171	0.135	9.57	9.25	8.66
900	11.6	0.173	0.136	9.62	9.27	9.24
950	11.9	0.176	0.137	9.67	9.30	9.8<
1000	12.1	0.178	0.138	9.72	9.32	10.40
1050	12.4	0.180	0.139	9.76	9.34	10.98
1100	12.6	0.183	0.140	9.81	9.36	11.57
1150	12.8	0.186	0.141	9.85	9.38	12.16
1200	13.1	0.188	0.142	9.89	9.40	12.75
1250	13.3	0.190	0.143	9.94	9.42	13.34
1300	13.6	0.193	0.144	10.00	9.45	13.94
1350	13.8	0.195	0.144	10.04	9.47	14.54
1400	14.1	0.197	0.145	10.09	9.49	15.15
1450	14.3	0.199	0.146	10.15	9.52	15.76
1500	14.5	0.201	0.147	10.19	9.53	16.37

27 Cr (446/XM 27) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	11.6	0.222	0.111	5.02	----	0.00
100	11.6	0.220	0.112	5.07	5.06	0.18
150	11.7	0.217	0.115	5.14	5.12	0.49
200	11.7	0.214	0.118	5.22	5.15	0.80
250	11.8	0.211	0.120	5.29	5.20	1.12
300	11.8	0.208	0.123	5.36	5.23	1.44
350	11.9	0.206	0.125	5.44	5.26	1.77
400	11.9	0.203	0.128	5.51	5.30	2.10
450	12.0	0.201	0.131	5.58	5.33	2.43
500	12.0	0.198	0.134	5.66	5.37	2.77
550	12.1	0.195	0.138	5.73	5.40	3.11
600	12.2	0.192	0.141	5.80	5.43	3.46
650	12.2	0.189	0.145	5.88	5.47	3.81
700	12.3	0.186	0.149	5.94	5.50	4.16
750	12.3	0.183	0.153	6.02	5.54	4.52
800	12.4	0.179	0.157	6.09	5.57	4.88
	12.5	0.174	0.162	6.16	5.61	5.25
900	12.6	0.170	0.167	6.23	5.65	5.62
950	12.6	0.165	0.174	6.30	5.68	6.00
1000	12.7	0.159	0.182	6.37	5.72	6.38
1050	12.8	0.152	0.194	6.44	5.75	6.76
1100	12.9	0.145	0.208	6.51	5.79	7.15
1120	----	0.143	0.215*	-----	-----	-----
1150	13.0	0.150	0.198	6.58	5.82	7.55
1200	13.1	0.160	0.184	6.65	5.86	7.94
1250	13.2	0.169	0.174	6.72	5.89	8.34
1300	13.4	0.176	0.170	6.79	5.93	8.75
1350	13.5	0.182	0.167	6.86	5.96	9.16
1400	13.7	0.189	0.166	6.92	6.00	9.57
1450	13.8	0.194	0.164	6.99	6.03	10.00
1500	14.0	0.199	0.163	7.06	6.07	10.41

28 Ni - 19 Cr - Cu - Mo (CN7M) STEEL

Temperature (F)	Thermal Conductivity (Btu hr^{-1} ft^{-1} F^{-1})	Thermal Diffusivity (ft^2 hr^{-1})	Specific Heat (Btu lb^{-1} F^{-1})	Instantaneous Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Mean Coefficient of Thermal Linear Expansion (10^{-6} F^{-1})	Thermal Linear Expansion (10^{-2} in ft^{-1})
70	7.0	0.122	0.114	8.72	----	0.00
100	7.2	0.123	0.116	8.84	8.75	0.32
150	7.5	0.126	0.118	8.93	8.85	0.85
200	7.7	0.128	0.120	9.02	8.90	1.39
250	8.0	0.131	0.121	9.11	8.99	1.94
300	8.2	0.134	0.123	9.20	9.04	2.50
350	8.5	0.137	0.124	9.29	9.09	3.05
400	8.6	0.140	0.125	9.38	9.14	3.62
450	9.0	0.143	0.126	9.48	9.18	4.19
500	9.3	0.146	0.127	9.57	9.22	4.76
550	9.6	0.149	0.128	9.66	9.26	5.33
600	9.8	0.151	0.129	9.76	9.30	5.92
650	10.1	0.154	0.130	9.86	9.35	6.51
700	10.3	0.157	0.131	9.95	9.39	7.10
750	10.6	0.160	0.132	10.04	9.44	7.70
800	10.8	0.163	0.132	10.14	9.48	8.30
850	11.1	0.166	0.133	10.24	9.53	8.92
900	11.3	0.168	0.134	10.34	9.57	9.54
950	11.6	0.171	0.135	10.44	9.62	10.16
1000	11.8	0.173	0.136	10.54	9.67	10.79
1050	12.1	0.176	0.137	10.64	9.71	11.42
1100	12.3	0.178	0.138	10.75	9.76	12.07
1150	12.6	0.180	0.139	10.86	9.81	12.71
1200	12.8	0.182	0.140	10.96	9.86	13.37
1250	13.1	0.184	0.141	11.06	9.91	14.03
1300	13.3	0.186	0.142	11.17	9.96	14.70
1350	13.6	0.189	0.143	11.28	10.01	15.37
1400	13.8	0.191	0.144	11.38	10.06	16.05
1450	14.0	0.193	0.145	11.49	10.11	16.73
1500	14.3	0.195	0.146	11.60	10.16	17.43

APPENDIX B

LISTINGS OF NOMINAL COMPOSITIONS

VERSUS

APPLICABLE SPECIFICATIONS

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
C Steel		SA-31, Gr A&B	K03100
		SA-53, Gr A	K02504
		Gr B	K03005
		SA-134	
		SA-135, Gr A	
		SA-155, Gr C45	(K01700)
		Gr C50	(K02200)
		Gr C55	(K02801)
		SA-178, Gr A	K01200
		Gr C	K03503
		SA-179	K01200
		SA-194, Gr 1	K01503
		Gr 2, 2M&2H	K04002
		SA-214	K01807
		SA-283, Gr A,B,C&D	
		SA-285, Gr A	K01700
		Gr B	K02200
		Gr C	K02801
		SA-307, Gr B	
		SA-325	
		SA-354, Gr BB,BC&BD	K04100
		SA-414, Gr A	K01501
		Gr B	K02201
		Gr C	K02503
		SA-449	K04200
		SA-556, Gr A2	K01807
		SA-557, Gr A	K01807
		Gr B	K03007
		SA-587	
		SA-671, Gr CA55	(K02801)
		SA-672, Gr A45	(K01700)
		Gr A50	(K02200)
		Gr A55	(K02801)
		SA-675, Gr 45-70	

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
C-Si Steel		SA-105	K03504
		SA-106, Gr A	K02501
		Gr B	K03006
		Gr C	K03501
		SA-155, Gr KC55	(K02001)
		Gr KC60	(K02401)
		Gr KC65	(K02800)
		Gr KC70	(K03101)
		Gr KCF55	(K01800)
		SA-181, Gr I&II	K03502
		SA-192	K01201
		SA-210, Gr A-1	K02707
		SA-216, Gr WCA	J02502
		Gr WCB	J03002
		SA-226	K01201
		SA-234, Gr WPA/WPAW WPB/WPBW&WPC	
		SA-266, Cl. 1&2	K03506
		Cl. 3	K05001
		SA-352, Gr LCA	J02504
		Gr LCB	J03003
		Gr LCC	J02505
		SA-369, Gr FPA	K02501
		SA-372, Cl. I	K03002
		SA-508, Cl. 1	K13502
		SA-515, Gr 55	K02001
		Gr 60	K02401
		Gr 65	K02800
		Gr 70	K03101
		SA-516, Gr 55	K01800
		SA-541, Cl. 1	K03506
		SA-556, Gr B2	K02707
		SA-649, Cl. 2	K05001
		SA-660, Gr WCA&WCB	

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
C-Si Steel (cont.)		SA-671, Gr CB60	(K02401)
		Gr CB65	(K02800)
		Gr CB70	(K03101)
		SA-672, Gr B55	(K02001)
		Gr B60	(K02401)
		Gr B65	(K02800)
		Gr B70	(K03101)
		Gr C55	(K01800)
C-Mn Steel		SA-135, Gr B	
		SA-333, Gr 1	K03008
		SA-334, Gr 1	K03008
		SA-414, Gr D	K02505
		Gr E	K02704
		Gr F	K03102
		Gr G	K03103
		SA-455, Type I	K03300
		SA-557, Gr C	K03505
C-Mn-Si Steel		SA-36	K02600
		SA-155, Gr KCF60	(K02100)
		Gr KCF65	(K02403)
		Gr KCF70	(K02700)
		Gr CMSH70	(K02400)
		Gr CMS75	(K02803)
		Gr CMSH80	(K02400)
		SA-210, Gr C	K03501
		SA-216, Gr WCC	J02503
		SA-299	K02803
		SA-333, Gr 6	K03006
		SA-334, Gr 6	K03006
		SA-350, Gr LF1	K03009
		Gr LF2	K03011
		SA-369, Gr FPB	K03006

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
C-Mn-Si Steel (cont.)		SA-372, Cl. II	K04001
		Cl. III	K04801
		SA-420, Gr WPL6/WPL6W	
		SA-442, Gr 55	K02202
		Gr 60	K02402
		SA-455, Type II	K02802
		SA-516, Gr 60	K02100
		Gr 65	K02403
		Gr 70	K02700
		SA-524, Gr I&II	K02104
		SA-537, Cl. 1&2	K02400
		SA-556, Gr C2	K03006
		SA-612	K02900
		SA-660, Gr WCC	
		SA-662, Gr A	K01701
		Gr B	K02203
		SA-671, Gr CC60	(K02100)
		Gr CC65	(K02403)
		Gr CC70	(K02700)
		Gr CD70	(K02400)
		Gr CD80	(K02400)
		Gr CE55	(K02202)
		Gr CE60	(K02402)
		Gr CK75	(K02803)
		SA-672, Gr C60	(K02100)
		Gr C65	(K02403)
		Gr C70	(K02700)
		Gr D70	(K02400)
		Gr D80	(K02400)
		Gr E55	(K02202)
		Gr E60	(K02402)
		Gr N75	(K02803)
		SA-695, Type B, Gr 35 & 40	

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
C-Mn-Si (cont.)		SA-696, Gr B&C	K03200
		SA-738	
C-1/2 Mo		SA-155, Gr CM65	K11820
		Gr CM70	K12020
		Gr CM75	K12320
		SA-182, Gr F1	K12822
		SA-204, Gr A	K11820
		Gr B	K12020
		Gr C	K12320
		SA-209, Gr T1	K11522
		Gr T1a	K12023
		Gr T1b	K11422
		SA-217, Gr WC1	J12522
		SA-234, Gr WP1/WP1W	
		SA-250, Gr T1	K11522
		Gr T1a	
		Gr T1b	K11422
		SA-335, Gr P1	
		SA-336, Gr F1	K12520
		SA-352, Gr LC1	
		SA-369, Gr FP1	K11522
		SA-426, Gr CP1	
		SA-517, Gr J	K11625
		SA-672, Gr L65	(K11820)
		Gr L70	(K12020)
		Gr L75	(K12320)
1/2 Cr - 1/5 Mo			
1/2 Cr - 1/5 Mo-V		SA-517, Gr B	K11630
1/2 Cr - 1/4 Mo-Si		SA-517, Gr A	K11856
		SA-592, Gr A	K11856

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
1/2 Cr - 1/2 Mo	1/2 Cr	SA-155, Gr 1/2 CR	(K12143)
		SA-182, Gr F2	K12122
		SA-213, Gr T2	K11547
		SA-335, Gr P2	K11547
		SA-369, Gr FP2	K11547
		SA-387, Gr 2	K12143
		SA-426, Gr CP2	
1/2 Cr - 1/2 Ni - 1/5 Mo		SA-372, Cl. V, Type C	K13049
		Cl. V, Type D	K13547
1/2 Cr - 1 1/4 Mn - Si		SA-202, Gr A	K11742
		Gr B	K12542
3/4 Cr - 1/2 Ni - Cu		SA-423, Gr 1	K11535
1 Cr - V		SA-213, Gr T17	K12047
1 Cr - 1/5 Mo	AISI 4140	SA-193, Gr B7&B7M	
		SA-194, Gr 7	
		SA-320, Gr L7&L7B	
		SA-372, Cl. V, Type A	K13047
		Cl. V, Type B	K13548
		Cl. V, Type E	
		Cl. VIII	
1 Cr - 1/5 Mo - Si		SA-517, Gr D	K11662
1 Cr - 1/2 Mo	1 Cr	SA-155, Gr 1CR	(K11757)
		SA-182, Gr F12	K11564
		SA-213, Gr T12	K11562
		SA-234, Gr WP12/WP12W	
		SA-335, Gr P12	K11562

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
1 Cr - 1/2 Mo (cont.)	1 Cr (cont.)	SA-336, Gr F12	K11564
		SA-369, Gr FP12	K11562
		SA-387, Gr 12	K11757
		SA-426, Gr CP12	
		SA-649, Cl. 1A	K14247
1 Cr - 1/2 Mo-V	Cr-Mo-V	SA-193, Gr B16	K14072
		SA-540, Gr B21	K14073
1 Cr - 1 Mn - 1/4 Mo	4142-H	SA-540, Gr B22	
1 1/4 Cr - 1/2 Mo		SA-217, Gr WC6	J12072
		SA-426, Gr CP11	
1 1/4 Cr - 1/2 Mo - Si	1 1/4 Cr	SA-155, Gr 1 1/4 CR	(K11789)
		SA-182, Gr F11	K11572
		SA-199, Gr T11	K11597
		SA-213, Gr T11	K11597
		SA-234, Gr WP11/ WP11W	
		SA-335, GR P11	K11597
		SA-369, Gr FP11	K11597
		SA-387, Gr 11	K11789
1 3/4 - 1/2 Mo - Cu		SA-517, Gr E	K21604
		SA-592, Gr E	K11695
2 Cr - 1/2 Mo		SA-199, Gr T3b	K21509
		SA-213, Gr T3b	K21509
		SA-369, Gr FP3b	K21509
2 1/4 Cr - 1 Mo	2 1/4 Cr	SA-155, Gr 2 1/4 CR	(K21590)
		SA-182, Gr F22	K12122
		SA-199, Gr T22	K21590

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
2 1/4 Cr - 1 Mo (cont.)	2 1/4 Cr (cont.)	SA-213, Gr T22	K21590
		SA-217, Gr WC9	J21890
		SA-234 WP22/WP22W	
		SA-335, Gr P22	K21590
		SA-336, Gr F22/F22A	K21590
		SA-369, Gr FP22	K21590
		SA-387, Gr 22	K21590
		SA-426, Gr CP22	
		SA-487, Cl. 8N	J22091
		SA-542, Cl. 1&2	K21590
3 Cr - 1 Mo	3 Cr	SA-182, Gr F21	K31545
		SA-199, Gr T21	K31545
		SA-213, Gr T21	K31545
		SA-335, Gr P21	K31545
		SA-336, Gr F21/F21a	K31545
		SA-369, Gr FP21	K31545
		SA-387, Gr 21	K31545
		SA-426, Gr CP21	
5 Cr - 1/2 Mo	5 Cr - or AISI 501	SA-155, Gr 5 CR	(K41545)
		SA-182, Gr F5	K41545
		Gr F5a	K42544
		SA-193, Gr B5	S50100
		SA-194, Gr 3	S50100
		SA-199, Gr T5	K41545
		SA-213, Gr T5	K41545
		SA-217, Gr C5	J42045
		SA-234, WP5/WP5W	
		SA-335, Gr P5	545
		SA-336, Gr F5	K41545
		Gr F5a	K42544
		SA-369, Gr FP5	K41545
		SA-387, Gr 5	S50100

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
5 Cr - 1/2 Mo (cont.)	5 Cr (cont.)	SA-426, Gr CF5	
5 Cr - 1/2 Mo - Si		SA-213, Gr T5b	K51545
		SA-335, Gr P5b	K51545
		SA-426, Gr CP5b	
5 Cr - 1/2 Mo - Ti		SA-213, Gr T5c	K41245
		SA-335, Gr P5c	K41245
7 Cr - 1/2 Mo	7 Cr	SA-182, Gr F7	K61595
		SA-199, Gr T7	K61595
		SA-213, Gr T7	K61595
		SA-335, Gr P7	K61595
		SA-369, Gr FP7	K61595
		SA-426, Gr CP7	
9 Cr - 1 Mo	9 Cr	SA-182, Gr F9	K90941
		SA-199, Gr T9	K81590
		SA-213, Gr T9	K81590
		SA-217, Gr C12	J82090
		SA-335, Gr P9	K81590
		SA-369, Gr FP9	K90941
		SA-426, Gr CP9	
Mn - V		SA-225, Gr A	K11803
		Gr B	K12003
		SA-487, Cl. 1N/1Q	J03004
Mn - 1/4 Mo		SA-372, Cl. IV	K14508
Mn - 1/2 Mo		SA-302, Gr A	K12021
		Gr B	K12022
		SA-533, Gr A	K12521
		SA-672, Gr H75	(K12021)

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
Mn - 1/2 Mo - 1/4 Ni		SA-533, Gr D	K12529
Mn - 1/2 Mo - 1/2 Ni		SA-302, Gr C	K12039
		SA-533, Gr B	K12539
		SA-672, Gr H80, J80, J90 & J100	
Mn - 1/2 Mo - 3/4 Ni		SA-302, Gr D	K12054
		SA-533, Gr C	K12554
1/2 Ni - 1/2 Mo - V		SA-541, Cl.3	K12045
1/2 Ni-1/2 Cr- 1/4 Mo-V		SA-487, Cl. 4N/4Q	J13047
3/4 Ni-1/2 Mo- Cr-V		SA-508, Cl.3	K12042
3/4 Ni - 1/2 Cu - Mo		SA-423, Gr 2	K11540
3/4 Ni-1/2 Mo-1/3 Cr-V		SA-508, Cl. 2/2a	K12766
		SA-541, Cl. 2/2a	K12765
3/4 Ni-1/2 Cr - 1/2 Mo-V		SA-517, Gr F	K11576
		SA-592, Gr F	K11576
3/4 Ni - 1 Mo - 3/4 Cr		SA-217, Gr WC5	J22000
1 Ni - 1/2 Cr - 1/2 Mo		SA-217, Gr WC4	J12082
1 1/4 Ni - 1 Cr - 1/2 Mo		SA-517, Gr P	K21650
1 3/4Ni-3/4 Cr-1/4 Mo	AISI 4340	SA-320, Gr L43	
2 Ni - 1 Cu		SA-350, Gr LF9	K22036
		SA-420, Gr WPL9	

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
2 Ni - 3/4 Cr - 1/4 Mo	E-4340-H	SA-540, Gr B23	
		SA-649, Cl. 1B	K24040
2 Ni - 3/4 Cr - 1/3 Mo	4340 Mod.	SA-540, Gr B24	
2 1/2 Ni		SA-203, Gr A	K21703
		Gr B	K22103
		SA-333, Gr 7	K21903
		SA-334, Gr 7	K21903
		SA-352, Gr LC2	J02506
3 1/2 Ni		SA-203, Gr D	K31718
		Gr E	K32018
		SA-333, Gr 3	K31918
		SA-334, Gr 3	K31918
		SA-350, Gr LF3	K32025
		SA-352, Gr LC3	J31550
		SA-420, Gr WPL3	
3 1/2 Ni-1 3/4 Cr-1/2 Mo-V		SA-508, Cl.4/4b	K22375
5 Ni - 1/4 Mo		SA-645	K41583
		SA-671, Gr CN	
8 Ni		SA-553, Type II	K71340
9 Ni		SA-333, Gr 8	K81340
		SA-334, Gr 8	K81340
		SA-353, Gr 9 Ni	K81340
		SA-420, Gr WPL8	
		SA-522	K81340
		SA-553, Type I	K81340
1 1/2 Si - 1/2 Mo		SA-335, Gr P15	K11578

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
12 Cr	AISI 403	SA-479, Type 403	S40300
12 Cr - 1 Al	AISI 405	SA-240, Type 405	S40500
		SA-268, Gr TP405	S40500
		SA-479, Type 405	S40500
13 Cr	AISI 410	SA-182, Gr F6a	K91151
		SA-193, Gr B6/B6X	S41000
		SA-194, Gr 6	S41000
		SA-217, Gr CA-15	J91150
		SA-240, Type 410	S41000
		SA-268, Gr TP410	S41000
		SA-336 Gr F6/F6a	K91151
		SA-426, Gr CPCA15	
		SA-479, Type 410	S41000
	AISI 416	SA-194, Gr 6F	S41600
	AISI 410S	SA-240, Type 410S	S41008
13 Cr - 4 Ni		SA-487, Cl. CA6NM	J91540
15 Cr	AISI 429	SA-182, Gr F429	S42900
		SA-240, Type 429	S42900
		SA-268, Gr TP429	S42900
16 Cr - 12 Ni - 2 Mo	AISI 316	SA-182, Gr F316	S31600
		SA-193, Gr B8M/B8MA	S31600
		SA-194, Gr 8M/8MA	S31600
		SA-213, Gr TP316	S31600
		SA-240, Type 316	S31600
		SA-249, Gr TP316	S31600
		SA-312, Gr TP316	S31600
		SA-320, Gr B8M	S31600
		SA-351, Gr F8M	
		SA-351, Gr CF8M	J92900

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
16 Cr - 12 Ni - 2 Mo (cont.)	AISI 316 (cont.)	SA-358, Gr 316	S31600
		SA-376, Gr TP316	S31600
		SA-403 WP316/ WP316W & WP316 HF	S31600
		SA-409, Gr TP316	S31600
		SA-430, Gr FP316	S31600
		SA-451 Gr CPF8M	J92900
		SA-479, Type 316	S31600
		SA-688, Gr TP316	S31600
	AISI 316L	SA-182, Gr F316L	S31603
		SA-213, Gr TP316L	S31603
		SA-240, Type 316L	S31603
		SA-249, Gr TP316L	S31603
		SA-312, Gr TP316L	S31603
		SA-351, Gr CF3M/ CF3MA	J92800
		SA-358, [illegible] 316L	S31603
		SA-403, WP316L/ WP316LW	S31603
		SA-479, Type 316L	S31603
		SA-688, Gr TP316L	S31603
	316H	SA-182, Gr F316H	S31609
		SA-213, Gr TP316H	S31609
		SA-240, Type 316H	S31609
		SA-249, Gr TP316H	S31609
		SA-312, Gr TP316H	S31609
		SA-358, Gr 316H	S31609
		SA-376, Gr TP316H	S31609
		SA-403, WP316H/ WP316HW & WP316HF	S31609
		SA-430, Gr FP316H	S31609
		SA-452, Gr TP316H	
		SA-479, Type 316H	S31609

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
16 Cr- 12 Ni- 2 Mo- N	AISI 316N	SA-182, Gr F316N	S31651
		SA-213, Gr TP316N	S31651
		SA-240, Type 316N	S31651
		SA-249, Gr TP316N	S31651
		SA-312, Gr TP316N	S31651
		SA-358, Gr 316N	S31651
		SA-376, Gr TP316N	S31651
		SA-403, WP316N/ WP316NW	S31651
		SA-430, Gr FP316N	S31651
		SA-479, Type 316N	S31651
17 Cr	AISI 430	SA-182, Gr F430	S43000
		SA-240, Type 430	S43000
		SA-268, Gr TP430	S43000
		SA-479, Type 430	S43000
17 Cr - 4 Ni - 4 Cu	17-4 PH or AISI 630	SA-564, Type 630	S17400
		SA-705, Type 630	S17400
18 Cr - 5 Ni - 3 Mo		SA-669	S31500
18 Cr - 8 Ni	AISI 302	SA-240, Type 302	S30200
		SA-479, Type 302	S30200
	AISI 303	SA-194, Gr 8F/8FA	S30300
		SA-320, Gr B8F	S30300
	AISI 303+Se	SA-194, Gr 8F/8FA	S30323
		SA-320, Gr B8F	S30323
	AISI 304	SA-182, Gr F304	S30400
		SA-193, Gr B8/B8A	S30400
		SA-194, Gr 8/8A	S30400
		SA-213, Gr TP304	S30400
		SA-240, Type 304	S30400
		SA-249, Gr TP304	S30400

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
18 Cr - 8 Ni (cont.)	AISI 304 (cont.)	SA-312, Gr TP304	S30400
		SA-320, Gr B8	S30400
		SA-336, Gr F8	
		SA-351, Gr CF8/CF8A	J92600
		SA-358, Gr 304	S30400
		SA-376, Gr TP304	S30400
		SA-403, WP304/ WP304W	S30400
		SA-409, Gr TP304	S30400
		SA-430, Gr FP304	S30400
		SA-451, Gr CPF8	J92600
		SA-479, Type 304	S30400
		SA-688, Gr TP304	S30400
	AISI 304L	SA-182, Gr F304L	S30403
		SA-213, Gr TP304L	S30403
		SA-240, Type 304L	S30403
		SA-249, Gr TP304L	S30403
		SA-312, Gr TP304L	S30403
		SA-351, Gr CP3/CF3A	J92500
		SA-358, Gr 304L	S30403
		SA-403, WP304L/ WP304LW	S30403
		SA-479, Type 304L	S30403
		SA-688, Gr TP304L	S30403
	304H	SA-182, Gr F304H	S30409
		SA-213, Gr TP304H	S30409
		SA-240, Type 304H	S30409
		SA-249, Gr TP304H	S30409
		SA-312, Gr TP304H	S30409
		SA-358, Gr 304H	S30409
		SA-376, Gr TP304H	S30409
		SA-403, WP304H/ WP304HW	S30409
		SA-430, Gr FP304H	S30409

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
18 Cr - 8 Ni (cont.)	304H (cont.)	SA-452, Gr TP304H	
		SA-479, Type 304H	S30409
18 Cr - 8 Ni - N	AISI 304N	SA-182, Gr F304N	S30451
		SA-213, Gr TP304N	S30451
		SA-240, Type 304N	S30451
		SA-249, Gr TP304N	S30451
		SA-312, Gr TP304N	S30451
		SA-358, Gr 304N	S30451
		SA-376, Gr TP304N	S30451
		SA-403, WP304N	
		WP304NW	S30451
		SA-430, Gr FP304N	S30451
		SA-479, Type 304N	S30451
18 Cr - 10 Ni - Cb	AISI 347	SA-182, Gr F347	S34700
		SA-193, Gr B8C/B8CA	S34700
		SA-194, Gr 8C/8CA	S34700
		SA-213, Gr TP347	S34700
		SA-240, Type 347	S34700
		SA-249, Gr TP347	S34700
		SA-312, Gr TP347	S34700
		SA-320, Gr B8C	S34700
		SA-336, Gr F8C	
		SA-351, Gr CF8C	J92710
		SA-358, G4 347	S34700
		SA-376, Gr TP347	S34700
		SA-403, WP347/	
		WP347W	S34700
		SA-409, Gr TP347	S34700
		SA-430, Gr FP347	S34700
		SA-451, Gr CPF8C	J92710
		SA-479, Type 347	S34700
	347H	SA-182, Gr F347H	S34709

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
18 Cr - 10 Ni - Cb	347H (cont.)	SA-213, Gr TP347H	S34709
		SA-240, Type 347H	S34709
		SA-249, Gr TP347H	S34709
		SA-312, Gr TP247H	S34709
		SA-376, Gr TP347H	S34709
		SA-403, WP347H/ WP347HW & WP347HF	S34709
		SA-430, Gr FP347H	S34709
		SA-452, Gr TP347H	
		SA-479, Type 347H	S34709
	AISI 348	SA-182, Gr F348	S34800
		SA-213, Gr TP348	S34800
		SA-240, Type 348	S34800
		SA-249, Gr TP348	S34800
		SA-312, Gr TP348	S34800
		SA-358, Gr 348	S34800
		SA-376, Gr TP348	S34800
		SA-403, WP348/ WP348H	S34800
		SA-409, Gr TP348	S34800
		SA-479, Type 348	S34800
	348H	SA-182, Gr F348H	S34809
		SA-213, Gr TP348H	S34809
		SA-240, Type 348H	S34809
		SA-249, Gr TP348H	S34800
		SA-312, Gr TP348H	S34800
		SA-479, Type 348H	S34800
18 Cr - 10 Ni - Ti	AISI 321	SA-182, Gr F321	S32100
		SA-193, Gr B8T/B8TA	S32100
		SA-194, Gr 8T/8TA	S32100
		SA-213, Gr TP321	S32100
		SA-240, Type 321	S32100
		SA-249, Gr TP321	S32100

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
18 Cr - 10 Ni - Ti	AISI 321	SA-312, Gr TP321	S32100
		SA-320, Gr B8T	S32100
		SA-336, Gr F8T	
		SA-358, Gr 321	S32100
		SA-376, Gr TP321	S32100
		SA-403, WP321/ WP321W	S32100
		SA-409, Gr TP321	S32100
		SA-430, Gr FP321	S32100
		SA-479, Type 321	S32100
	321H	SA-182, Gr F321H	S32109
		SA-213, Gr TP321H	S32109
		SA-240, Type 321H	S32109
		SA-249, Gr TP321H	S32109
		SA-312, Gr TP321H	S32109
		SA-376, Gr TP321H	S32109
		SA-403, WP321H/ WP321HW & WP321HF	S32109
		SA-430, Gr FP321H	S32109
		SA-479, Type 321H	S32109
18 Cr - 11 Ni	AISI 305	SA-194, Gr 8P/8PA	S30500
		SA-240, Type 305	S30500
18 Cr - 13 Ni - 3 Mo	AISI 317	SA-240, Type 317	S31700
		SA-249, Gr TP317	S31700
		SA-312, Gr TP317	S31700
		SA-403, WP317	S31700
	AISI 317L	SA-240, Type 317L	S31703
18 Cr - 18 Ni - 2 Si	XM-15	SA-213, Gr XM-15	S38100
		SA-240, Type XM15	S38100
		SA-249, Gr XM15	S38100
		SA-312, Gr TPXM15	S38100

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
19 Cr - 9 Ni - Mo - W	19-9DL	SA-453, Gr 651	K63198
22 Cr - 13 Ni - 5 Mn	XM-19	SA-182, Gr FXM-19	S20910
		SA-240, Type XM19	S20910
		SA-249, Gr TPXM-19	S20910
		SA-312, Gr TPXM-19	S20910
		SA-403, [illegible]XM-19	S20910
		SA-412, Type XM-19	S20910
		SA-479, Type XM-19	S20910
23 Cr - 12 Ni	AISI 309	SA-249, Gr TP309	S30900
		SA-312, Gr TP309	S30900
		SA-358. Gr 309	S30900
		SA-403, WP309/ WP309W	S30900
		SA-409, Gr TP309	S30900
	AISI 309S	SA-240, Type 309S	S30908
25 Cr - 12 Ni		SA-351, Gr CH8	J93400
		Gr CH20	J93402
		SA-451, Gr CPH8	J93400
		Gr CPH20	J93402
25 Cr - 20 Ni	AISI 310	SA-182, Gr F310	S31000
		SA-213, Gr TP310	S31000
		SA-249, Gr TP310	S31000
		SA-312, Gr TP310	S31000
		SA-336, Gr F25	
		SA-351, Gr CK20	J94202
		SA-358, Gr 310	S31000
		SA-403, WP310/ WP310W	S31000
		SA-409, Gr TP310	S31000
		SA-451, Gr CPK20	J94202

Nominal Composition Designation	Generic Designation	Applicable Specifications	UNS Number
25 Cr - 20 Ni (cont.)	AISI 310S	SA-240, Type 310S	S31008
		SA-479, Type 310S	S31008
27 Cr	XM-27	SA-182, Gr FXM-27	S44625
	AISI 446	SA-268, Gr TP446	S44600
26 Ni - 15 Cr - 2 Ti	A-286 or	SA-453, Gr 660	K66286
	AISI 660	SA-638, Gr 660	K66286
28 Ni - 19 Cr - Cu - Mo	CN7M	SA-351, Gr CN7M	J95150

APPENDIX C

LISTINGS OF SPECIFICATIONS/GRADES

VERSUS

NOMINAL COMPOSITION

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-31	Gr A		C Steel
	Gr B		C Steel
SA-36			C-Mn-Si Steel
SA-53	Gr A Ty E		C Steel
	Gr A Ty S		C Steel
	Gr B Ty E		C Steel
	Gr B Ty S		C Steel
SA-105			C-Si Steel
SA-106	Gr A		C-Si Steel
	Gr B		C-Si Steel
	Gr C		C-Si Steel
SA-134			C Steel
SA-135	Gr A		C Steel
	Gr B		C-Mn Steel
SA-155	Gr C45		C Steel
	Gr C50		C Steel
	Gr C55		C Steel
	Gr KC55		C-Si Steel
	Gr KC60		C-Si Steel
	Gr KC65		C-Si Steel
	Gr KC70		C-Si Steel
	Gr KCF55		C-Si Steel
	Gr KCF60		C-Mn-Si Steel
	Gr KCF65		C-Mn-Si Steel
	Gr KCF70		C-Mn-Si Steel
	Gr CM65		C-1/2 Mo
	Gr CM70		C-1/2 Mo

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-155	Gr CM75		C-1/2 Mo
	Gr CMSH70		C-Mn-Si Steel
	Gr CMS75		C-Mn-Si Steel
	Gr CMSH80		C-Mn-Si Steel
	Gr 1/2CR		1/2Cr-1/2Mo
	Gr 1 CR		1Cr-1/2Mo
	Gr 1 1/4CR		1 1/4Cr-1/2Mo-Si
	Gr 2 1/4CR		2 1/4Cr-1Mo
	Gr 5CR		5Cr-1/2Mo
SA-178	Gr A		C Steel
	Gr C		C Steel
SA-179			C Steel
SA-181	Gr I		C-Si Steel
	Gr II		C-Si Steel
SA-182	Gr F1		C-1/2Mo
	Gr F2		1/2Cr-1/2Mo
	Gr F5/F5a		5Cr-1/2Mo
	Gr F6a		13Cr
	Gr F7		7Cr-1/2Mo
	Gr F9		9Cr-1Mo
	Gr F11		1 1/4Cr-1/2Mo-Si
	Gr F12		1Cr-1/2Mo
	Gr F21		3Cr-1Mo
	Gr F22		2 1/4Cr-1Mo
	Gr FXM-27		27Cr
	Gr F429		15Cr
	Gr F430		17Cr
	Gr F304		18Cr-8Ni
	Gr F304H		18Cr-8Ni
	Gr F304L		18Cr-8Ni

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-182	Gr F304N		18Cr-8Ni-N
	Gr F310		25Cr-20Ni
	Gr F316		16Cr-12Ni-2Mo
	Gr F316H		16Cr-12Ni-2Mo
	Gr F316L		16Cr-12Ni-2Mo
	Gr F316N		16Cr-12Ni-2Mo-N
	Gr F321		18Cr-10Ni-Ti
	Gr F321H		18Cr-10Ni-Ti
	Gr F347		18Cr-10Ni-Cb
	Gr F347H		18Cr-10Ni-Cb
	Gr F348		18Cr-10Ni-Cb
	Gr F348H		18Cr-10Ni-Cb
	Gr FXM-19	22-13-5	22Cr-13Ni-5Mn
SA-192			C-Si Steel
SA-193	Gr B5	AISI Type 501	5Cr-1/2Mo
	Gr B6/B6X	AISI Type 410	13Cr
	Gr B7/B7M	AISI 4140	1Cr-1/5Mo
	Gr B16		1Cr-1/2Mo-V
	Gr B8/B8A	AISI Type 304	18Cr-8Ni
	Gr B8C/B8CA	AISI Type 347	18Cr-10Ni-Cb
	Gr B8M/B8MA	AISI Type 316	16Cr-12Ni-2Mo
	Gr B8T/B8TA	AISI Type 321	18Cr-10Ni-Ti
SA-194	Gr 1		C Steel
	Gr 2, 2M, 2H		C Steel
	Gr 3	AISI Type 501	5Cr-1/2Mo
	Gr 6	AISI Type 410	13Cr
	Gr 6F (S)	AISI Type 416+S	13Cr
	Gr 6F (Se)	AISI Type 416 Se	13Cr
	Gr 7	AISI 4140	1Cr-1/5Mo
	Gr 8/8A	AISI Type 304	18Cr-8Ni
	Gr 8C/8CA	AISI Type 347	18Cr-10Ni-Cb

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-194	Gr 8M, 8MA	AISI Type 316	16Cr-12Ni-2Mo
	Gr 8T, 8TA	AISI Type 321	18Cr-10Ni-Ti
	Gr 8F, 8FA	AISI Type 303+S	18Cr-8Ni
	Gr 8F, 8FA	AISI Type 303+Se	18Cr-8Ni
	Gr 8P, 8PA	AISI Type 305	18Cr-11Ni
SA-199	Gr T3b		2Cr-1/2Mo
	Gr T5		5Cr-1/2Mo
	Gr T7		7Cr-1/2Mo
	Gr T9		9Cr-1Mo
	Gr T11		1 1/4-1/2Mo-Si
	Gr T21		3Cr-1Mo
	Gr T22		2 1/4Cr-1Mo
SA-202	Gr A		1/2Cr-1 1/4Mn-Si
	Gr B		1/2Cr-1 1/4Mn-Si
SA-203	Gr A		2 1/2Ni
	Gr B		2 1/2Ni
	Gr D		3 1/2Ni
	Gr E		3 1/2Ni
SA-204	Gr A		C-1/2Mo
	Gr B		C-1/2Mo
	Gr C		C-1/2Mo
SA-209	Gr T1		C-1/2Mo
	Gr T1a		C-1/2Mo
	Gr T1L		C-1/2Mo
SA-210	Gr A-1		C-Si Steel
	Gr C		C-Mn-Si Steel
SA-213	Gr T2		1/2Cr-1/2Mo

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-213	Gr T3b		2Cr-1/2Mo
	Gr T5		5Cr-1/2Mo
	Gr T5b		5Cr-1/2Mo-Si
	Gr T5c		5Cr-1/2Mo-Ti
	Gr T7		7Cr-1/2Mo
	Gr T9		9Cr-1Mo
	Gr T11		1 1/4Cr-1/2Mo-Si
	Gr T12		1Cr-1/2Mo
	Gr T17		1Cr-V
	Gr T21		3Cr-1Mo
	Gr T22		2 1/4Cr-1Mo
	Gr TP304		18Cr-8Ni
	Gr TP304H		18Cr-8Ni
	Gr TP304L		18Cr-8Ni
	Gr TP304N		18Cr-8Ni-N
	Gr TP310		25Cr-20Ni
	Gr TP316		16Cr-12Ni-2Mo
	Gr TP316H		16Cr-12Ni-2Mo
	Gr TP316L		16Cr-12Ni-2Mo
	Gr TP316N		16Cr-12Ni-2Mo-N
	Gr TP321		18Cr-10Ni-Ti
	Gr TP321H		18Cr-10Ni-Ti
	Gr TP347		18Cr-10Ni-Cb
	Gr TP347H		18Cr-10Ni-Cb
	Gr TP348		18Cr-10Ni-Cb
	Gr TP348H		18Cr-10Ni-Cb
	Gr XM-15		18Cr-18Ni-2Si
SA-214			C Steel
SA-216	Gr WCA		C-Si Steel
	Gr WCB		C-Si Steel
	Gr WCC		C-Mn-Si Steel

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-217	Gr WC1		C-1/2Mo
	Gr WC4		1Ni-1/2Cr-1/2Mo
	Gr WC5		3/4Ni-1Mo-3/4Cr
	Gr WC6		1 1/4Cr-1/2Mo
	Gr WC9		2 1/4Cr-1Mo
	Gr C5		5Cr-1/2Mo
	Gr C12		9Cr-1Mo
	Gr CA-15		13Cr
SA-225	Gr A		Mn-V
	Gr B		Mn-V
SA-226			C-Si Steel
SA-234	WPA/WPAW		C-Si Steel
	WPB/WPBW		C-Si Steel
	WPC		C-Si Steel
	WP1/WP1W		C-1/2Mo
	WP12/WP12W		1Cr-1/2Mo
	WP11/WP11W		1 1/4Cr-1/2Mo-Si
	WP22/WP22W		2 1/4Cr-1Mo
	WP5/WP5W		5Cr-1/2Mo
SA-240	Type 302		18Cr-8Ni
	Type 304		18Cr-8Ni
	Type 304H		18Cr-8Ni
	Type 304L		18Cr-8Ni
	Type 304N		18Cr-8Ni-N
	Type 305		18Cr-11Ni
	Type 309S		23Cr-12Ni
	Type 310S		25Cr-20Ni
	Type 316		16Cr-12Ni-2Mo
	Type 316H		16Cr-12Ni-2Mo
	Type 316L		16Cr-12Ni-2Mo

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-240	Type 316N		16Cr-12Ni-2Mo-N
	Type 317		18Cr-13Ni-3Mo
	Type 317L		18Cr-13Ni-3Mo
	Type 321		18Cr-10Ni-Ti
	Type 321H		18Cr-10Ni-Ti
	Type 347		18Cr-10Ni-Cb
	Type 347H		18Cr-10Ni-Cb
	Type 348		18Cr-10Ni-Cb
	Type 348H		18Cr-10Ni-Cb
	Type XM15		18Cr-18Ni-2Si
	Type XM21		18Cr-8Ni-N
	Type XM19	22-13-5	22Cr-13Ni-5Mn
	Type 405		12Cr-1Al
	Type 410		13Cr
	Type 410S		13Cr
	Type 429		15Cr
	Type 430		17Cr
SA-249	Gr TP304		18Cr-8Ni
	Gr TP304H		18Cr-8Ni
	Gr TP304L		18Cr-8Ni
	Gr TP304N		18Cr-8Ni-N
	Gr TP309		23Cr-12Ni
	Gr TP310		25Cr-20Ni
	Gr TP316		16Cr-12Ni-2Mo
	Gr TP316H		16Cr-12Ni-2Mo
	Gr TP316L		16Cr-12Ni-2Mo
	Gr TP316N		16Cr-12Ni-2Mo-N
	Gr TP317		18Cr-13Ni-3Mo
	Gr TP321		18Cr-10Ni-Ti
	Gr TP321H		18Cr-10Ni-Ti
	Gr TP347		18Cr-10Ni-Cb
	Gr TP347H		18Cr-10Ni-Cb
	Gr TP348		18Cr-10Ni-Cb

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-249	Gr TP348H		18Cr-10Ni-Cb
	Gr XM-15	18-18-2	18Cr-18Ni-2Si
	Gr TPXM-19	22-13-5	22Cr-13Ni-5Mn
SA-250	Gr T1		C-1/2Mo
	Gr T1a		C-1/2Mo
	Gr T1b		C-1/2Mo
SA-266	Cl. 1		C-Si Steel
	Cl. 2		C-Si Steel
	Cl. 3		C-Si Steel
SA-268	Gr TP405		12Cr-1Al
	Gr TP410		13Cr
	Gr TP429		15Cr
	Gr TP430		17Cr
	Gr TP446		27Cr
SA-283	Gr A		C Steel
	Gr B		C Steel
	Gr C		C Steel
	Gr D		C Steel
SA-285	Gr A		C Steel
	Gr B		C Steel
	Gr C		C Steel
SA-299			C-Mn-Si Steel
Sa-302	Gr A		Mn-1/2Mo
	Gr B		Mn-1/2Mo
	Gr C		Mn-1/2Mo-1/2Ni
	Gr D		Mn-1/2Mo-3/4Ni

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-307	Gr B		C Steel
SA-312	Gr TP304		18Cr-8Ni
	Gr TP304H		18Cr-8Ni
	Gr TP304L		18Cr-8Ni
	Gr TP304N		18Cr-8Ni-N
	Gr TP309		23Cr-12Ni
	Gr TP310		25Cr-20Ni
	Gr TP316		16Cr-12Ni-2Mo
	Gr TP316H		16Cr-12Ni-2Mo
	Gr TP316L		16Cr-12Ni-2Mo
	Gr TP316N		16Cr-12Ni-2Mo-N
	Gr TP317		18Cr-13Ni-3Mo
	Gr TP321		18Cr-10Ni-Ti
	Gr TP321H		18Cr-10Ni-Ti
	Gr TP347		18Cr-10Ni-Cb
	Gr TP347H		18Cr-10Ni-Cb
	Gr TP348		18Cr-10Ni-Cb
	Gr TP348H		18Cr-10Ni-Cb
	Gr TPXM15		18Cr-18Ni-2Si
	Gr TPXM19	22-13-5	22Cr-13Ni-5Ni
SA-320	Gr L7	AISI 4140	1Cr-1/5Mo
	Gr L7B	AISI 4137	1Cr-1/5Mo
	Gr L43	AISI 4340	1 3/4Ni-3/4Cr-1/4Mo
	Gr B8	AISI 304	18Cr-8Ni
	Gr B8C	AISI 347	18Cr-10Ni-Cb
	Gr B8T	AISI 321	18Cr-10Ni-Ti
	Gr B8F	AISI 303+S	18Cr-8Ni
	Gr B8F	AISI 303+Se	18Cr-8Ni
	Gr B8M	AISI 316	16Cr-12Ni-2Mo
SA-325			C Steel

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-333	Gr 1		C-Mn Steel
	Gr 3		3 1/2 Ni
	Gr 4		3/4Cr-3/4Ni-Cu-Al
	Gr 6		C-Mn-Si Steel
	Gr 7		2 1/2Ni
	Gr 8		9Ni
	Gr 9		2Ni-1Cu
SA-334	Gr 1		C-Mn Steel
	Gr 3		3 1/2Ni
	Gr 6		C-Mn-Si Steel
	Gr 7		2 1/2Ni
	Gr 8		9Ni
	Gr 9		2Ni-1Cu
SA-335	Gr P1		C-1/2Mo
	Gr P2		1/2Cr-1/2Mo
	Gr P5		5Cr-1/2Mo
	Gr P5b		5Cr-1/2Mo-Si
	Gr P5c		5Cr-1/2Mo-Ti
	Gr P7		7Cr-1/2Mo
	Gr P9		9Cr-1Mo
	Gr P11		1 1/4Cr-1/2Mo-Si
	Gr P12		1Cr-1/2Mo
	Gr P15		1 1/2Si-1/2Mo
	Gr P21		3Cr-1Mo
	Gr P22		2 1/4Cr-1Mo
SA-336	Gr F1		C-1/2Mo
	Gr F12		1Cr-1/2Mo
	Gr F5/F5a		5Cr-1/2Mo
	Gr F6/F6a		13Cr
	Gr F21/F21a		3Cr-1Mo
	Gr F22/F22A		2 1/4Cr-1Mo

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-336	Gr F8	AISI 304	18Cr-8Ni
	Gr F8M	AISI 316	16Cr-12Ni-2Mo
	Gr F8C	AISI 347	18Cr-10Ni-Cb
	Gr F8T	AISI 321	18Cr-10Ni-Ti
	Gr F25	AISI 310	25Cr-20Ni
SA-350	Gr LF1		C-Mn-Si Steel
	Gr LF2		C-Mn-Si Steel
	Gr LF3		3 1/2 Ni
	Gr LF9		2Ni-1Cu
SA-351	Gr CF3/CF3A	AISI 304L	18Cr-8Ni
	Gr CF8/CF8A	AISI 304	18Cr-8Ni
	Gr CF3M/CF3MA	AISI 316L	16Cr-12Ni-2Mo
	Gr CF8M	AISI 316	16Cr-12Ni-2Mo
	Gr CF8C	AISI 347	18Cr-10Ni-Cb
	Gr CH8		25Cr-12Ni
	Gr CH20		25Cr-12Ni
	Gr CK20	AISI 310	25Cr-20Ni
	Gr CN7M		28Ni-19Cr-Cu-Mo
SA-352	Gr LCA		C-Si Steel
	Gr LCB		C-Si Steel
	Gr LCC		C-Si Steel
	Gr LC1		C-1/2Mo
	Gr LC2		2 1/2Ni
	Gr LC3		3 1/2Ni
SA-353	9Ni		9Ni
SA-354	Gr BB		C Steel
	Gr BC		C Steel
	Gr BD		C Steel

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-358	Gr 304		18Cr-8Ni
	Gr 304H		18Cr-8Ni
	Gr 304N		18Cr-8Ni-N
	Gr 309		23Cr-12Ni
	Gr 310		25Cr-20Ni
	Gr 316		16Cr-12Ni-2Mo
	Gr-316H		16Cr-12Ni-2Mo
	Gr 316N		16Cr-12Ni-2Mo-N
	Gr 321		18Cr-10Ni-Ti
	Gr 347		18Cr-10Ni-Cb
	Gr 304L		18Cr-8Ni
	Gr 316L		16Cr-12Ni-2Mo
	Gr 348		18Cr-10Ni-Cb
SA-369	Gr FPA		C-Si Steel
	Gr FPB		C-Mn-Si Steel
	Gr FP1		C-1/2Mo
	Gr FP2		1/2Cr-1/2Mo
	Gr FP3b		2Cr-1/2Mo
	Gr FP5		5Cr-1/2Mo
	Gr FP7		7Cr-1/2Mo
	Gr FP9		9Cr-1Mo
	Gr FP11		1 1/4Cr-1/2Mo-Si
	Gr FP12		1Cr-1/2Mo
	Gr FP21		3Cr-1Mo
	Gr FP22		2 1/4Cr-1Mo
SA-372	Cl. I		C-Si Steel
	Cl. II		C-Mn-Si Steel
	Cl. III		C-Mn-Si Steel
	Cl. IV		Mn-1/4Mo
	Cl. V, Type A		1Cr-1/5Mo
	Cl. V, Type B		1Cr-1/5Mo
	Cl. V, Type C		1/2Cr-1/2Ni-1/5Mo

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-372	Cl. V, Type D		1/2Cr-1/2Ni-1/5Mo
	Cl. V, Type E		1Cr-1/5Mo
	Cl. VIII		1Cr-1/5Mo
SA-376	Gr TP304		18Cr-8Ni
	Gr TP304H		18Cr-8Ni
	Gr TP304N		18Cr-8Ni-N
	Gr TP316		16Cr 12Ni-2Mo
	Gr TP316H		16Cr-12Ni-2Mo
	Gr TP316N		16Cr-12Ni-2Mo-N
	Gr TP321		18Cr-10Ni-Ti
	Gr TP321H		18Cr-10Ni-Ti
	Gr TP347		18Cr-10Ni-Cb
	Gr TP347H		18Cr-10Ni-Cb
	Gr TP348		18Cr-10Ni-Cb
SA-387	Gr 2		1/2Cr-1/2Mo
	Gr 12		1Cr-1/2Mo
	Gr 11		1 1/4Cr-1/2Mo-Si
	Gr 22		2 1/4Cr-1Mo
	Gr 21		3Cr-1Mo
	Gr 5		5Cr-1/2Mo
SA-403	WP304/WP304W		18Cr-8Ni
	WP304H/WP304HW		18Cr-8Ni
	WP304HF		18Cr-8Ni
	WP304L/WP304LW		18Cr-8Ni
	WP304N/WP304NW		18Cr-8Ni-N
	WP309/WP309W		23Cr-12Ni
	WP310/WP310W		25Cr-20Ni
	WP347/WP347W		19Cr-10Ni-Cb
	WP347H/WP347HW		18Cr-10Ni-Cb
	WP347HF		18Cr-10Ni-Cb
	WP348/WP348W		18Cr-10Ni-Cb

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-403	WP316/WP316W		16Cr-12Ni-2Mo
	WP316H/WP316HW		16Cr-12Ni-2Mo
	WP316HF		16Cr-12Ni-2Mo
	WP316L/WP316LW		16Cr-12Ni-2Mo
	WP316N/WP316NW		16Cr-12Ni-2Mo-N
	WP317		18Cr-13Ni-3Mo
	WP321/WP321W		18Cr-10Ni-Ti
	WP321H/WP321HW		18Cr-10Ni-Ti
	WP321HF		18Cr-10Ni-Ti
	WPXM-19		22Cr-13Ni-5Mn
SA-409	Gr TP304		18Cr-8Ni
	Gr TP309		23Cr-12Ni
	Gr TP310		25Cr-20Ni
	Gr TP321		18Cr-10Ni-Ti
	Gr TP347		18Cr-10Ni-Cb
	Gr TP316		16Cr-12Ni-2Mo
	Gr TP317		18Cr-13Ni-3Mo
	Gr TP348		18Cr-10Ni-Cb
SA-412	Type XM-19	22-13-5	22Cr-13Ni-5Mn
SA-414	Gr A		C Steel
	Gr B		C Steel
	Gr C		C Steel
	Gr D		C-Mn Steel
	Gr E		C-Mn Steel
	Gr F		C-Mn Steel
	Gr G		C-Mn Steel
SA-420	Gr WPL6/WPL6W		C-Mn-Si Steel
	Gr WPL9		2Ni-1Cu
	Gr WPL3		3 1/2Ni
	Gr WPL8		9 Ni

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-423	Gr 1		3/4Cr-1/2Ni-Cu
	Gr 2		3/4Ni-1/2Cu-Mo
SA-426	Gr CP1		C-1/2Mo
	Gr CP2		1/2Cr-1/2Mo
	Gr CP5		5Cr-1/2 Mo
	Gr CP5b		5 Cr-1/2Mo-Si
	Gr CP7		7Cr-1/2Mo
	Gr CP9		9Cr-1Mo
	Gr CP11		1 1/4Cr-1/2Mo
	Gr CP12		1Cr-1/2Mo
	Gr CP21		3Cr-1Mo
	Gr CP22		2 1/4Cr-1Mo
	Gr CPCA15		13Cr
SA-430	Gr FP304		18Cr-8Ni
	Gr FP304H		18Cr-8Ni
	Gr FP304N		18Cr-8Ni-N
	Gr FP316		16Cr-12Ni-2Mo
	Gr FP316H		16Cr-12Ni-2Mo
	Gr FP316N		16Cr-12Ni-2Mo-N
	Gr FP321		18Cr-10Ni-Ti
	Gr FP321H		18Cr-10Ni-Ti
	Gr FP347		18Cr-10Ni-Cb
	Gr FP347H		18Cr-10Ni-Cb
SA-442	Gr 55		C-Mn-Si Steel
	Gr 60		C-Mn-Si Steel
SA-449			C Steel
SA-451	GR CPF8	AISI 304	18Cr-8Ni
	Gr CPF8M	AISI 316	16Cr-12Ni-2Mo
	Gr CPF8C	AISI 347	18Cr-10Ni-Cb

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-451	Gr CPH8		25Cr-12Ni
	Gr CPH20		25Cr-12Ni
	Gr CPK20	AISI 310	25Cr-20Ni
SA-452	Gr TP304H		18Cr-8Ni
	Gr TP347H		18Cr-10Ni-Cb
	Gr TP316H		16Cr-12Ni-2Mo
SA-453	Gr 660	A-286	26Ni-15Cr-2Ti
	Gr 651	19-9 DL	19Cr-9Ni-Mo-W
SA-455	Type I		C-Mn Steel
	Type II		C-Mn-Si Steel
SA-479	Type 302		18Cr-8Ni
	Type 304		18Cr-8Ni
	Type 304H		18Cr-8Ni
	Type 304L		18Cr-8Ni
	Type 304N		18Cr-8Ni-N
	Type 310S		25Cr-20Ni
	Type 316		16Cr-12Ni-2Mo
	Type 316H		16Cr-12Ni-2Mo
	Type 316L		16Cr-12Ni-2Mo
	Type 316N		16Cr-12Ni-2Mo-N
	Type 321		18Cr-10Ni-Ti
	Type 321H		18Cr-10Ni-Ti
	Type 347		18Cr-10Ni-Cb
	Type 347H		18Cr-10Ni-Cb
	Type 348		18Cr-10Ni-Cb
	Type 348H		18Cr-10Ni-Cb
	Type 403		12Cr
	Type 405		12Cr-1Al
	Type 410		13Cr
	Type 430		17Cr

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-479	Type XM-19	22-13-5	22Cr-13Ni-5Mn
SA-487	Cl 1N/1Q		Mn-V
	Cl 4N/4Q		1/2Ni-1/2Cr-1/4Mo-V
	Cl CA15M		13Cr
	Cl CA6NM		13Cr-4Ni
	Cl 8N		2 1/4Cr-1Mo
SA-508	Cl 1		C-Si Steel
	Cl 2/2a		3/4Ni-1/2Mo-1/3Cr-V
	Cl 3		3/4Ni-1/2Mo-Cr-V
	Cl 4/4b		3 1/2Ni-1 3/4Cr-1/2Mo-V
SA-515	Gr 55		C-Si Steel
	Gr 60		C-Si Steel
	Gr 65		C-Si Steel
	Gr 70		C-Si Steel
SA-516	Gr 55		C-Si Steel
	Gr 60		C-Mn-Si Steel
	Gr 65		C-Mn-Si Steel
	Gr 70		C-Mn-Si Steel
SA-517	Gr A		1/2Cr-1/4Mo-Si
	Gr B		1/2Cr-1/5Mo-V
	Gr D		1Cr-1/5Mo-Si
	Gr E		1 3/4Cr-1/2Mo-Cu
	Gr F		3/4Ni-1/2Cr-1/2Mo-V
	Gr J		C-1/2Mo
	Gr P		1 1/4Ni-1Cr-1/2Mo
SA-522			9Ni
SA-524	Gr I		C-Mn-Si Steel

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-524	Gr II		C-Mn-Si Steel
SA-533	Gr A		Mn-1/2Mo
	Gr B		Mn-1/2Mo-1/2Ni
	Gr C		Mn-1/2Mo-3/4Ni
	Gr D		Mn-1/2Mo-1/4Ni
SA-537	Cl 1		C-Mn-Si Steel
	Cl 2		C-Mn-Si Steel
SA-540	Gr B21	Cr-Mo-V	1Cr-1/2Mo-V
	Gr B22	4142-H	1Cr-1Mn-1/4Mo
	Gr B23	E-4340-H	2Ni-3/4Cr-1/4Mo
	Gr B24	4340 Mod	2Ni-3/4Cr-1/3Mo
SA-541	Cl 1		C-Si Steel
	Cl 2/2a		3/4Ni-1/2Mo-1/3Cr-V
	Cl 3		1/2Ni-1/2Mo-V
SA-542	Cl 1		2 1/4Cr-1Mo
	Cl 2		2 1/4Cr-1Mo
SA-553	Type I		9 Ni
	Type II		8 Ni
SA-556	Gr A2		C Steel
	Gr B2		C-Si Steel
	Gr C2		C-Mn-Si Steel
SA-557	Gr A		C Steel
	Gr B		C Steel
	Gr C		C-Mn Steel
SA-564	Type 630	17-4 PH	17Cr-4Ni-4Cu

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-587			C Steel
SA-592	Gr A		1/2Cr-1/4Mo-Si
	Gr E		1 3/4Cr-1/2Mo-Cu
	Gr F		3/4Ni-1/2Cr-1/2Mo-V
SA-612			C-Mn-Si Steel
SA-638	Gr 660	A-286	26Ni-15Cr-2Ti
SA-645			5Ni-1/4Mo
SA-649	Cl. 1A		1Cr-1/2Mo
	Cl. 1B		2Ni-3/4Cr-1/4Mo
	Cl. 2		C-Si Steel
SA-660	Gr WCA		C-Si Steel
	Gr WCB		C-Si Steel
	Gr WCC		C-Mn-Si Steel
SA-662	Gr A		C-Mn-Si Steel
	Gr B		C-Mn-Si Steel
SA-669			18Cr-5Ni-3Mo
SA-671	Cr CA55		C Steel
	Gr CB60		C-Si Steel
	Gr CB65		C-Si Steel
	Gr CB70		C-Si Steel
	Gr CC60		C-Mn-Si Steel
	Gr CC65		C-Mn-Si Steel
	Gr CC70		C-Mn-Si Steel
	Gr CD70		C-Mn-Si Steel

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-671	Gr CD80		C-Mn-Si Steel
	Gr CE55		C-Mn-Si Steel
	Gr CE60		C-Mn-Si Steel
	Gr CK75		C-Mn-Si Steel
	Gr CN		5Ni-1/4Mo
SA-672	Gr A45		C Steel
	Gr A50		C Steel
	Gr A55		C Steel
	Gr B55		C-Si Steel
	Gr B60		C-Si Steel
	Gr B65		C-Si Steel
	Gr B70		C-Si Steel
	Gr C55		C-Si Steel
	Gr C60		C-Mn-Si Steel
	Gr C65		C-Mn-Si Steel
	Gr C70		C-Mn-Si Steel
	Gr D70		C-Mn-Si Steel
	Gr D80		C-Mn-Si Steel
	Gr E55		C-Mn-Si Steel
	Gr E60		C-Mn-Si Steel
	Gr H75		Mn-1/2Mo Steel
	Gr H80		Mn-1/2Mo-1/2Ni
	Gr J80		Mn-1/2Mo-1/2Ni
	Gr J90		Mn-1/2No-1/2Ni
	Gr J100		Mn-1/2Mo-1/2Ni
	Gr L65		C-1/2Mo
	Gr L70		C-1/2Mo
	Gr L75		C-1/2Mo
	Gr N75		C-Mn-Si Steel
SA-675	Gr 45-70		C Steel
SA-688	Gr TP304		18Cr-8Ni

ASME Specification Number	Grade, Type, or Class	Generic Designation	Nominal Composition Designation
SA-688	Gr TP304L		18Cr-8Ni
	Gr TP316		16Cr-12Ni-2Mo
	Gr TP316L		16Cr-12Ni-2Mo
SA-695	Type B, Gr 35		C-Mn-Si Steel
	Type B, Gr 40		C-Mn-Si Steel
SA-696	Gr B		C-Mn-Si Steel
	Gr C		C-Mn-Si Steel
SA-705	Type 630	17-4 PH	17Cr-4Ni-4Cu
SA-738	C-Mn-Si		C-Mn-Si Steel

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